Construction Methods and Equipment

McGraw-Hill Publishing Company, Inc.

August, 1939

20 Cents

UILDING CONSTRUCTION — Three articles of which the first deals the prefabrication of multiple farmstead units for the Farm Security dministration in South Carolina; the second tells how a 13-story eel-frame hospital was erected noiselessly with the aid of structural ding; the third is a step-by-step pictorial sequence on building ncrete columns.

NTI-TRUST SUITS — An outline of the Department of Justice's ion-wide program of attack against restraints of trade in the ding industry by Thurman W. Arnold, assistant attorney-general.

In This Issue

BUILDING 20-FT. ROADWAY atop steel truss railway bridge to form traffic link in Florida's Overseas Highway connecting mainland with Key West. (Front Cover Photo)

HIGHWAYS — Bituminous repaving of Cape Cod Canal bridge roadways. "Highways of History," a pictorial presentation of road-building development set against backgrounds of steel age. Prefabricated asphalt plant.

PIPE-LINE WELDING — A review of latest field practice, including ... forms, welding tips, low alloy steel rods, field stress-relieving and ... bending.

Construction Methods and Equipment

Copyright, 1939 — 330 West 42nd St., New York — Established 1919

ELDRIDGE HAYNES, Publisher

AUGUST, 1939

ROBERT K. TOMLIN, Editor
A. E. PAXTON, Manager

Editorial Staff: Vincent B. Smith, Paul Wooton (Washington), Nelle Fitzgerald

A McGRAW-HILL PUBLICATION

CURRENT JOBS

. . . . and Who's Doing Them

HIGHWAYS

Recent awards by the Pennsylvania Turnpike Commission for sections of 161-mi. road between Pittsburgh and Harrisburg are as follows: **Walker Bros.**, of Chambersburg, Pa., $886,027; **Dalton Bros., Inc.**, of Paoli, Pa., $234,593; **N. B. Putnam & Co.**, Harrisburg, Pa., $164,956; **W. H. Shaull & Son**, Mechanicsburg, Pa., $287,834; **H. R. Dickens**, Philadelphia, $138,467; **Nello L. Teer**, Durham, N. C., $795,244; **N. R. Corbisello**, Binghamton, N. Y., $882,710; **Johnson, Drake & Piper, Inc.**, Freeport, L. I., $1,213,588; **Herman Holmes**, Crystal Falls, Mich., $1,513,504; **Ritter Brothers**, Harrisburg, Pa., $199,270.

WATERWORKS AND SEWERS

Bids were received on July 27 for Lackawack dam, one of the big projects of New York City's Delaware aqueduct. Low bid of $15,486,150 was submitted by **Mason & Hanger Co., Inc.**, of New York City. Other bids for Lackawack dam were: **Jahn, Bressi, Bevanda Construction Co., Inc.**, of Los Angeles, $16,195,700; **Keystone Co.**, San Francisco, $16,720,150; **B. Perini & Sons, C. J. Maney & Rugo Construction Co.**, Framingham, Mass., $19,794,288; and **Lackawack Dam Corp.**, Pleasantville, N. Y., $22,134,000. In Chicago a contract amounting to $1,589,200 for water filtration plant and tunnels went to **Wenzel Henoch Co.**, of Milwaukee, Wis. For furnishing and laying 100,000 ft. of 42-in. concrete pipe in Harrisburg, Pa., **Lock Joint Pipe Co.**, of Ampere, N. J., was low bidder with price of $1,138,657. Water mains are being laid in Seattle, Wash., by **Argentieri & Colarossi** for $128,899. A bid of $276,856 obtained the contract for sewage disposal plant at Wilson, N. C., for **A. H. Guion & Co.**, of Charlotte, N. C. For diversion sewer in Washington, D. C., low bid of $1,698,284 was submitted by **Joseph Lombardi Co.**, Philadelphia. A sewage disposal plant costing $549,779 is under construction at Waterloo, Iowa, by **Dobson & Robinson**, of Lincoln, Neb. A $542,185 contract for sewers for Brooklyn, N. Y., was awarded to **Luang Construction Co.**, of Brooklyn. In Gary, Ind., **Strandberg & Spencer, Inc.**, of Chicago, are building a sewage pumping plant for $422,883. In Lockport, N. Y., **Connelly Bros.**, of Buffalo, have started work on a $320,000 main interceptor sewer. Lateral sewers in Trenton, N. J., went to **Eastern Engineering Co.**, of Atlantic City, N. J., for $278,400. Sewage treatment plant costing $199,545 will be built in North Tarrytown, N. Y., by **Knight & Timoney.**

In Oklahoma **Mittry Bros. Construction Co.**, of Los Angeles, was successful bidder with price of $2,641,670 for the spillway section of the Great Falls Plains dam on the Arkansas River. Low bidder for channel improvements at Hornell, N. Y., was **Spencer & Ross**, of Detroit, with price of $1,466,912. At Ceredo, W. Va., Ohio River levees will be built by **R. Meyers**, Salem, Ind., at price of $1,306,771. A contract for $886,403 for concrete flood wall and earth dike on Connecticut River at Holyoke, Mass., was awarded to **Daniel O'Connell Sons, Inc.**, Holyoke. Dredging of the White River in Arkansas will be done by **Driver Contracting Co.** and **H. N. Rodgers & Sons**, of Memphis, Tenn., for $744,718. In New York a barge canal excavation to cost $448,054 is under way by **S. A. Scullen, Inc.**, of Cohoes, N. Y. At Seward, Alaska, **M. P. Butler**, of Seattle, Wash., received a $432,000 contract for Lowell Creek tunnel and works. Levees on the Pearl River at Louisiana are being built by **Clarke Bros. Construction Co.**, Clinton, Iowa, for $288,288.

BUILDINGS

Public — Slum clearance and housing project in Memphis, Tenn., went to **S. & W. Construction Co.**, local contractor, for $2,785,362. With price of $1,173,000, **Ring Construction Corp.**, of Minneapolis, Minn., received housing contract in Pittsburgh, Pa. For navy barracks and other buildings at Alameda, Calif., a bid of $1,395,716 obtained contract for **Johnson, Drake & Piper, Inc.**, of Los Angeles. Branch Brook Park Housing Project in Newark, N. J., went to **Leopold Neckerman, Inc.**, of New York City, for $888,000. In Wyndmoor, Pa., a research laboratory was bid in by **Sordoni Construction Co.**, of Wilkes-Barre, Pa., for $842,000. Central High School in Cleveland, $811,879, is under contruction by **Schirmer Peterson Co.**, local contractor. **Anderson & Ringrose**, of San Francisco, are building a $654,000 Junior High School in San Francisco. The Miami, Fla., Housing Authority awarded a $737,659 contract to **Fred Howland, Inc.**, of Miami. A $538,785 hospital will be built in Danville, Ky., by **James I. Barnes Construction Co.**, of Logansport, Ind. Contract for a $526,400 gun assembly shop in Washington, D. C., went to **James Stewart & Co.**, of New York City. Warehouses in Richmond, Va., were bid in by **Delmar Construction Co.**, of Philadelphia, for $433,900.

Industrial — In Jersey City, N. J., **United Engineers & Constructors**, of Philadelphia, will erect a $1,000,000 switch house for the Public Service Electric & Gas Co. An industrial building at Clarksville, Tenn., to cost $1,000,000 is under construction by **Batson-Cook Co.**, West Point, Ga. At Quincy, Mass., **James Stewart & Co.**, Boston, will build a $1,000,000 soap factory for Procter & Gamble Co. A nine-story cereal building for General Mills, Inc., Buffalo, N. Y., costing $900,000 is under construction by **Charles H. Wing, Inc.**, of Buffalo. An assembly plant contract for Ford Motor Co. at Dearborn, Mich., was let to **Bryant & Detwiler Co.**, of Detroit, for $500,000.

Commercial — Kew Gardens, Long Island, N. Y. — **B. M. Hess** and **S. Kessler**, of Jamaica, L. I., have started a $3,000,000 home development. From Bryn Mawr Village Apartments Corp., Chicago, **Patrick Warren Construction Co.**, of Chicago, received a $3,000,000 contract. A group of 200 homes costing $1,250,000 will be built at Peekskill, N. Y., by **Tri-Company Construction Corp.**, of Peekskill. For Montgomery Ward & Co., at Detroit, **George A. Fuller Co.**, of Chicago, will build a $1,250,000 mercantile store. For the Ford Foundation at Dearborn, Mich., **Byrne Organization**, of Detroit, will build 203 apartments costing $1,000,000. In Mobile, Ala., a $1,000,000 hotel went to **Goode Construction Corp.** Atlanta, Ga. A new building for Tiffany Co. at Fifth Ave. & 57th St., New York City, will be built for $1,000,000 by **Turner Construction Co.** A $500,000 contract for three-story store building in Raleigh, N. C., went to **G. W. Kane Construction Co.**, Greensboro, N. C.

The "How" of it

For the benefit of readers concerned with the practical application of method or equipment the following references are to articles or illustrations in this issue that tell:

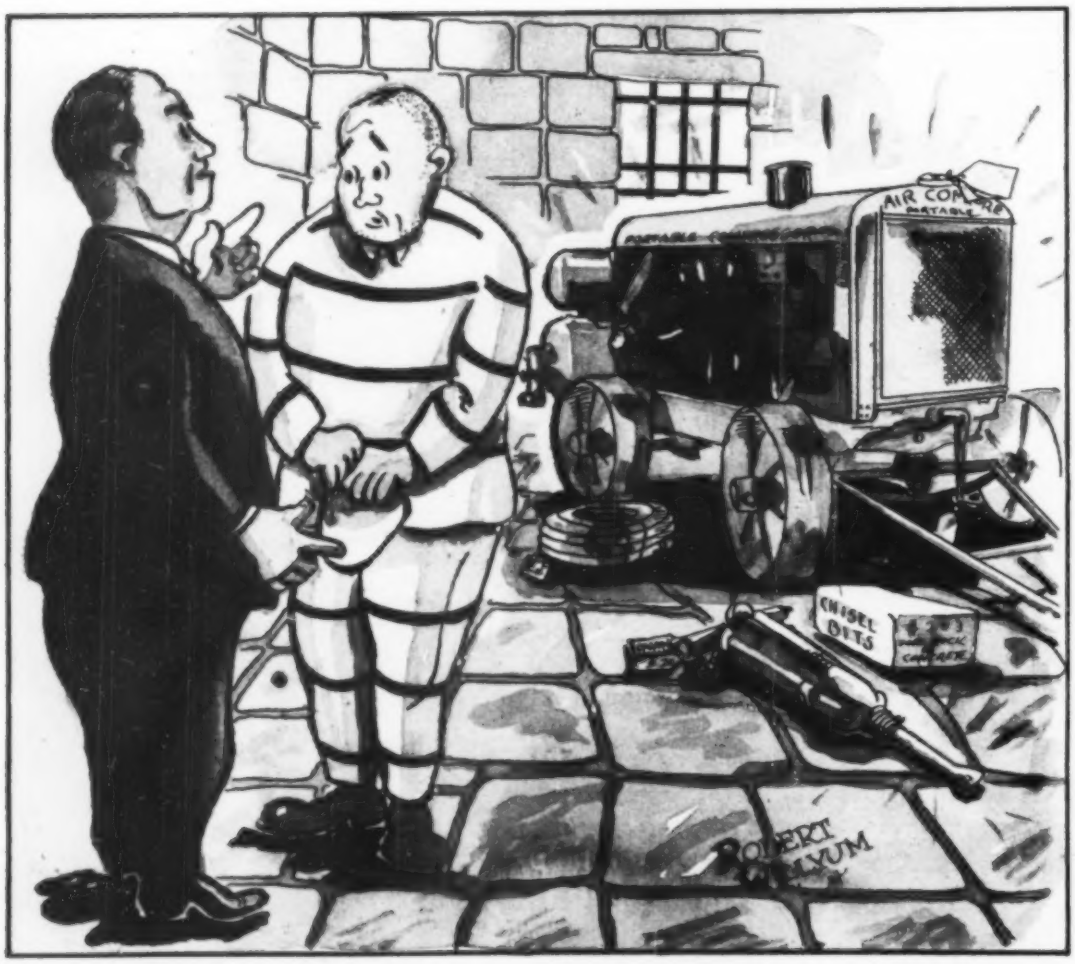
CONSTRUCTION Methods and Equipment. August, 1939. Volume 21. Number 8. Published Monthly, price 20¢ a copy. Subscription rates — United States, Canada, Mexico and Central and South American countries, $1.00 a year; three years for $2.00. All other countries, $2.00 a year or 8 shillings. Entered (or reentered) as second class matter December 16, 1936 at the Post Office at New York, N. Y., under the act of March 3rd, 1879. Printed in U.S.A. Cable address: "McGrawhill, New York." Member of A.B.P. Member of A.B.C. Contents Copyrighted 1939 by McGraw-Hill Publishing Co., Inc., 330 West 42nd Street, New York, N. Y.

McGRAW-HILL PUBLISHING COMPANY, INC., 330 WEST 42d STREET, NEW YORK, N. Y.

JAMES H. McGRAW, Founder and Honorary Chairman

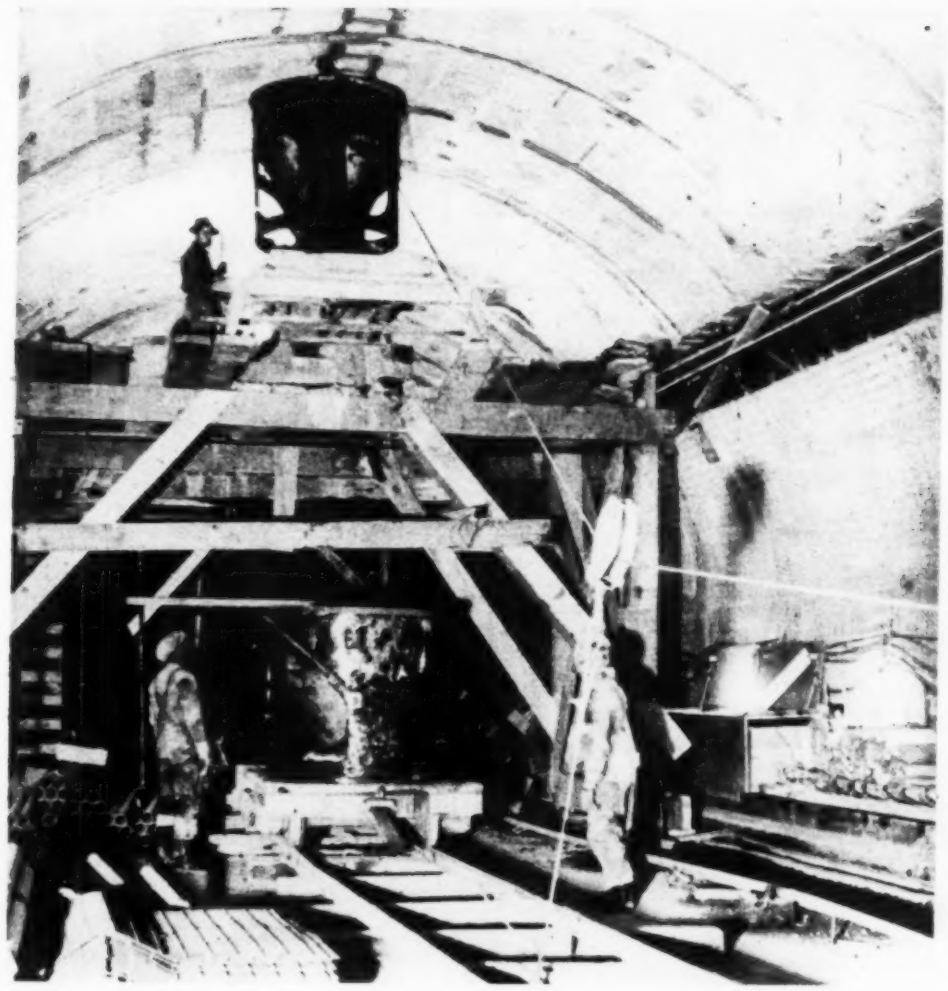
Editorial and Publishing Offices: 330 West 42nd St., New York; 520 North Michigan Ave., Chicago; 68 Post St., San Francisco; Aldwych House, London, W. C. 2, England. Branch Offices: Washington; Philadelphia; Cleveland; Detroit; St. Louis; Boston; Atlanta, Ga.

JAMES H. McGRAW, JR., President — HOWARD EHRLICH, Executive Vice-President — MASON BRITTON, Vice-Chairman — B. R. PUTNAM, Treasurer — D. C. McGRAW, Secretary — J. E. BLACKBURN, Circulation Manager



"Hello—Acme Employment Agency? Listen, you sent me the wrong kind of a home wrecker."

"Come clean now. Did you put in the order for this equipment?



'INCOR' WORKED LIKE CLOCKWORK ON THE LINCOLN TUNNEL

A WELL-PLANNED construction project is like a smooth-running piece of machinery; schedules move like clockwork; materials have to keep pace. That is where the dependable, uniform high early strength of 'Incor' 24-Hour Cement helps and helps no end. Case in point, New York's Lincoln Tunnel:

Time was pressing — ceiling concrete for the South tube had to be speeded to assure on-time opening. Job schedules showed that by using 'Incor' and stripping forms in 24 hours, one complete cycle of operations could be completed every 48 hours, with only one form set.

Underpinning & Foundation Company, New York, contractors, applied for, and received, Port of New York Authority's permission to use 'Incor'. 'Incor' worked like clockwork on this closely-scheduled job. Specifications permitted stripping at 2000 lb.; 'Incor' produced 2200 to 2700 lb. at 24 hours.

Came time to concrete the ceiling of the North tube. Here, time wasn't pressing; *but 'Incor' had saved money as well as time on the South tube, so the Contractor, on his own initiative, used 'Incor' on the North tube, too.* Figure it out for yourself. One set of forms instead of two; curing costs reduced: 24-hour service strengths, day after day, exceeding specifications.

It pays to figure every job with both Lone Star and 'Incor'. Use 'Incor'* where dependable 24-hour service strengths show a net saving; elsewhere, use Lone Star. You gain either way — because better cement makes better concrete. Write for copy of "Cutting Concrete Costs." Lone Star Cement Corporation, Room 2262, 342 Madison Ave., New York.

*Reg. U. S. Pat. Off.

LONE STAR CEMENT CORPORATION

MAKERS OF LONE STAR CEMENT • • • 'INCOR' 24-HOUR CEMENT

Sales Offices: ALBANY, BIRMINGHAM, BOSTON, CHICAGO, DALLAS, HOUSTON, INDIANAPOLIS, JACKSON, MISS., KANSAS CITY, NEW ORLEANS, NEW YORK, NORFOLK, PHILADELPHIA, ST. LOUIS, WASHINGTON, D. C.

Best Shovel Buy-

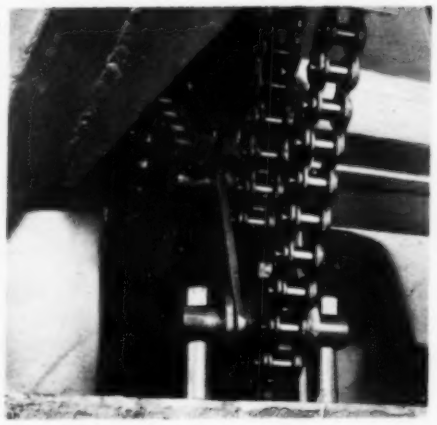
For low-cost yardage BAY CITY advantages offer biggest value

The heavy duty features you look for in your large shovels are included in the fundamental basic design of BAY CITY machines from 3/8 yard. We have not cheapened our small machines to sell at a price, but have retained all the many advantages to give you big yardage, speed, power, easy operation and convertibility without machinery change. A few of these features are illustrated on this page. Look them over—then if interested in low-cost yardage, write for your copy of Catalog H-2. No obligation.

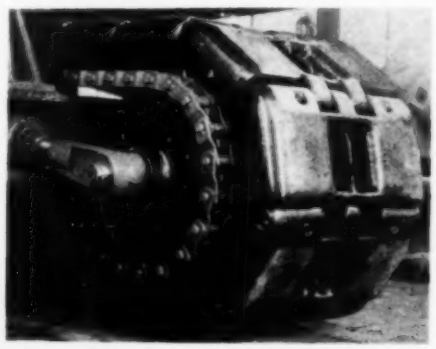
BAY CITY SHOVELS, Inc., BAY CITY, MICHIGAN

Export Office: H. M. HEIN, 330 W. 42nd St., New York (Oparo)

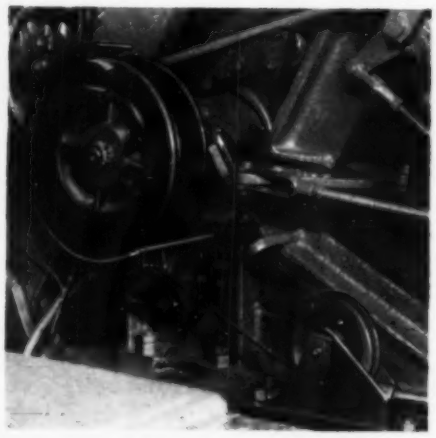
BAY CITY ½ yard shovel caught in the act of "doing its stuff" on rip-rap work on shores of beautiful Lake Chelan, Washington. Photo shows Model 30 loosening boulders from cliff—substituting for blasting—a method not always recommended.



Not only independent and positive but a *one-piece* continuous chain crowd from front drum to shipper shaft — a money saving feature.



This unique out-board bearing on crawler drive is but one of many ways in which maintenance cost is reduced in standard construction.



The effectiveness of this instantaneous Electric Dipper Trip adds from 10 to 25% to daily yardage — and there's no extra charge.

All Bay City full revolving shovels are fully convertible without machinery changes—no extra gadgets, drums, chains, etc., to buy—Just change front end attachment.

One-piece unit-cast alloy steel carbody and revolving table absorbs shock and vibration — no deadweight.

Fast, easy travel and steering under full power in either direction by simply applying pressure on cone clutches that operate brakes — no stopping to shift.

Power operated, booster clutches give easier operation without operation fatigue. Actuated by short lever throw without effort.

Straddle dipper sticks with welded crowd racking and sturdy electric welded box type boom.

BAY CITY SHOVELS

Not an Ounce of Lazy Horsepower in the

A NEW DAY is here for users of heavy-duty mobile power! The new 70 h.p. International TD-18 Diesel TracTracTor brings a new standard of operating performance and economy into the picture . . . more work, lower costs, bigger profits.

The power and flexibility of the International 6-cylinder *full* Diesel engine are coordinated to a fine point with other features in the TD-18 . . . *a higher percentage of the maximum drawbar horsepower*—70 h.p.—*can be kept continuously applied to get more work done per day at lower cost.*

The engine starts easily and quickly from the operator's seat—no time lost by man or machine in getting on the job.

The TD-18 is the easiest steering crawler tractor built. Engine power, not manpower, reléases the steering clutches through power-release actuators built into the clutches.

Six forward and two reverse speeds provide close selection of traveling speed to load without loss in engine r.p.m. or maximum horsepower capacity. Automatic clutch brake facilitates fast shifting of gears.

These features enable the operator to take full advantage of the power available . . . and make the TD-18 *unusually easy to handle* and *easy on the operator.*

Find out what the TD-18 offers for your jobs. The nearby International industrial power dealer or Company-owned branch will give you full details. Remember that there are five other TracTracTors in the International line, also five wheel-type tractors, and eleven power units.

INTERNATIONAL HARVESTER COMPANY
(INCORPORATED)
180 North Michigan Avenue **Chicago, Illinois**

INTERNATIONAL

New INTERNATIONAL TD-18 DIESEL

THESE FEATURES MEAN EFFICIENCY, LOW COST, LONG LIFE

1. Six-cylinder full Diesel engine.

2. Engine is started easily from the operator's seat.

3. Six forward and two reverse speeds.

4. Automatic clutch brake for fast gear shifting.

5. Easiest steering crawler tractor built. Power-actuated steering clutches.

6. Steering levers and pedals adjustable to suit operator.

7. Pivot shaft relieved of twisting stresses, and tracks kept in alignment, by ball-and-socket outer pivots, diagonal-arm inner pivot bearings, and roller stabilizer.

8. Track shoes keyed to track links to prevent loosening of shoes.

9. Triple-gear oil pump. Full-pressure engine lubrication at all working angles.

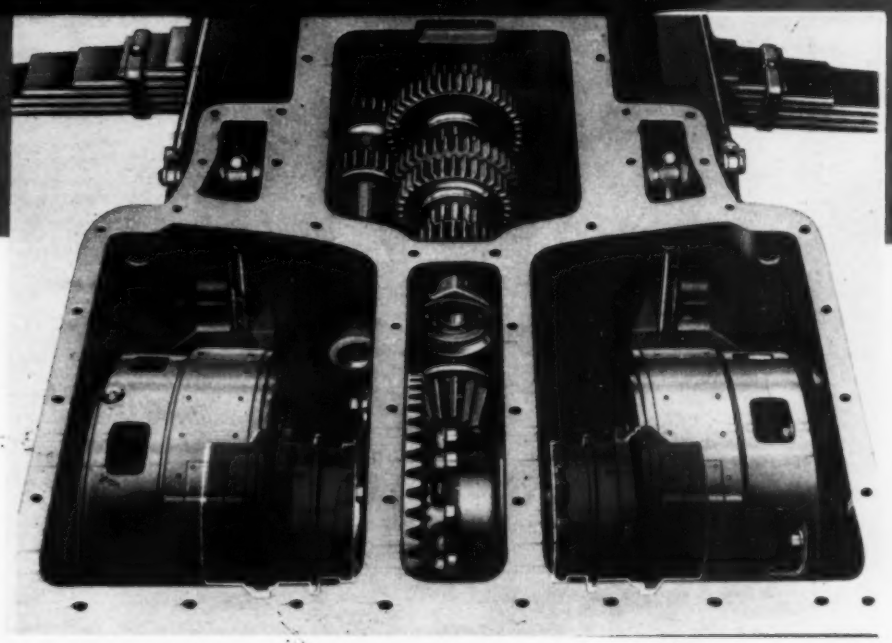
10. Positive track roller lubrication at all speeds. Quintuple-sealed track rollers have patented gravity lubrication at low speeds and pressure lubrication at high speeds. Oil and dirt seals on both sides of sprockets. Self-cleaning idler wheel.

11. Tocco-hardened crankshaft with replaceable main and connecting rod bearings.

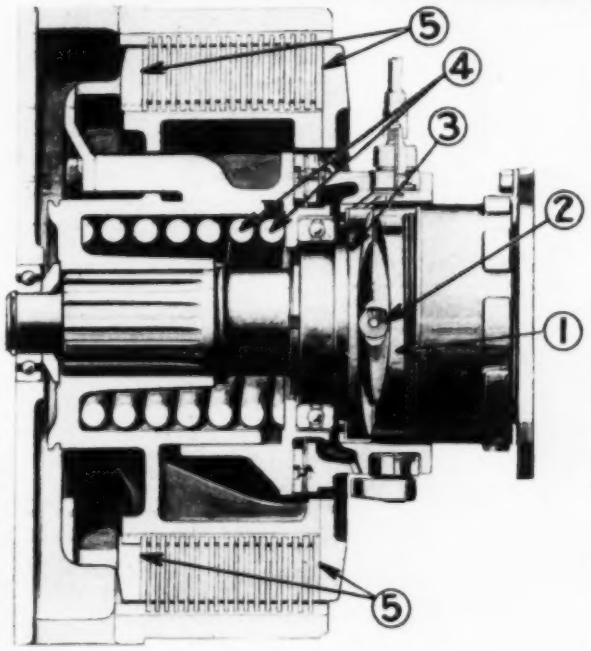
12. Unit construction. Each steering brake, steering clutch, track frame assembly, and other units, adjusted or replaced without disturbing adjacent parts.

13. Famous TracTracTor accessibility. More productive hours, low maintenance cost.

14. Allied equipment engineered for the TD-18 by well-known manufacturers.

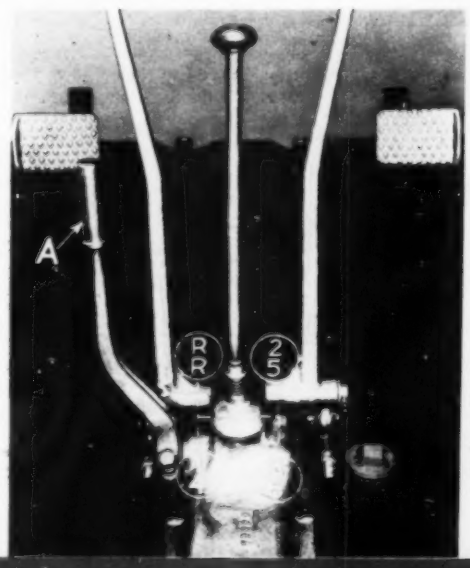


Easiest Steering Crawler Tractor Built — Power-Release Actuators Do the Work



● *Finger-tip pressure* releases the multiple-disc steering clutches in the TD-18 . . . the engine, not the operator, does the work through power-release actuators built into the clutches. Location of the actuators in the clutches is shown above in color. The cross-section views show how they work. Only enough pressure is needed on the clutch lever to move a friction surface against the rotating clutch hub. Cam (3) rotates about a quarter turn on rollers (2), which separate cams (1) and (3). Cam (3) compresses main clutch spring (4) and releases clutch plates (5).

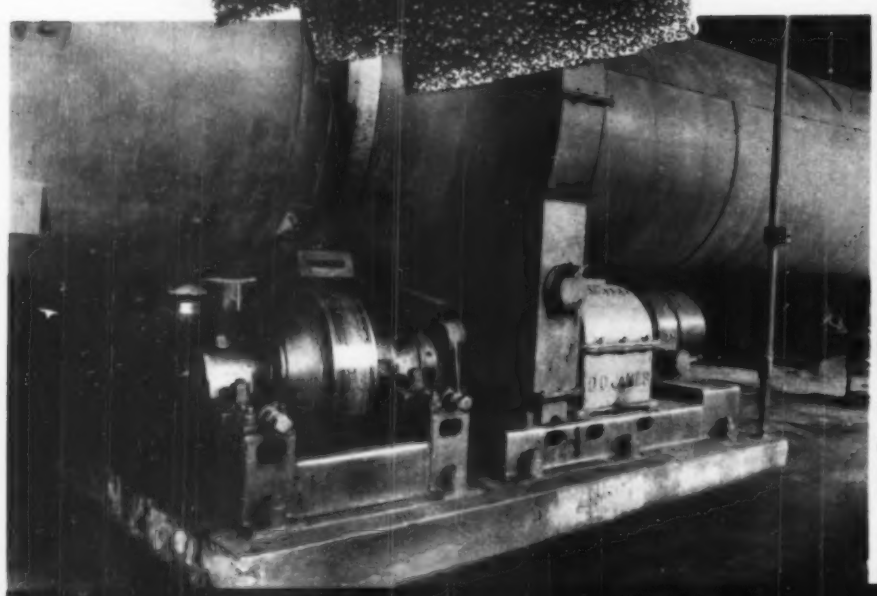
The power-release actuators relieve the operator of the hard pull ordinarily required to operate slow-speed, multiple-disc steering clutches—saving his strength and reducing fatigue. In addition, the clutches are *fully* engaged or disengaged—no drag on the discs, no unnecessary wear and heating. Brake assistance is seldom required when there is a load on the drawbar.



Six forward speeds of 1½, 2, 2½, 3¼, 4½, and 5¾ miles an hour, and two reverse speeds of 1½ and 3¼ miles an hour, provide close selection of speed to load. Automotive-type shift for both low and high range, and automatic clutch brake, provide natural, easy, fast shifting. The first three forward speeds and low reverse are obtained when lever (A) is pushed down; when lever is up, the high range is obtained.

Industrial Power

HOT SPOTS TO LUBRICATE



Trunion bearings operating at 200° F. on rotary kiln lubricated with Texaco Marfak

Close up of bull gear and ring driving mechanism. Texaco Crater Compound keeps gear teeth continually protected.

Crushed-Slate Processor Solves the Problem

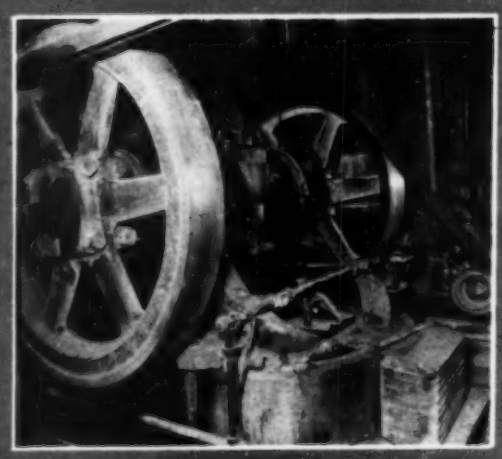
WITH THEIR BIG ROTARY KILNS operating at 2200°F., their driving gears and trunion bearings continually exposed to temperatures of around 200°F., Minnesota Mining & Mfg. Co., at their Wausau, Wisc. plant had a tough lubrication problem to handle.

To meet this "red hot" situation, they turned to Texaco, specifying Texaco Crater Compound for the kiln bull gears, Texaco Marfak for the trunions.

For more than 2 years these lubricants have performed splendidly, withstanding these extreme bearing temperatures and pressures perfectly. During this period there have been no failures, no shut-downs due to lubrication.

Texaco engineers experienced in the selection and application of Texaco Lubricants for high temperature conditions gladly offer you their help. For this engineering service, or to place an order, phone the nearest of our 2229 warehouses, or write:

The Texas Company, 135 E. 42nd St., N. Y. C., N. Y.



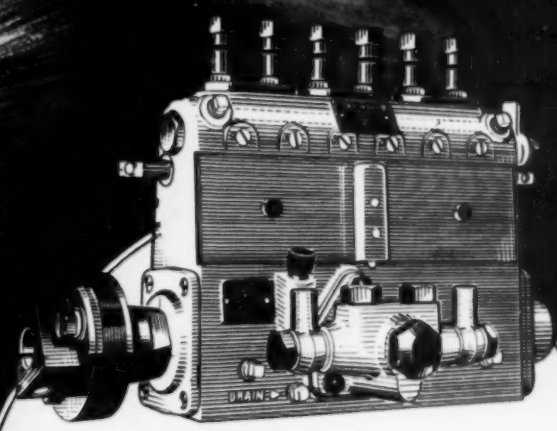
Jaw crusher operating from sub-zero temperatures to upwards of 90° F., Texaco lubricated.

TEXACO

Crater Compound

The ideal lubricant for heavy-duty exposed gears and wire rope. Keeps gears quiet, longer-lasting. Gives wire rope added life, protects against corrosion.

Heir Apparent OR *Guinea Pig?*



THE engine builder who uses American Bosch Fuel Injection Equipment insures his engine against the experimental or little tried. He becomes heir to the oldest and richest fuel injection experience in America . . . heir to time-tested standards of materials and workmanship . . . heir to nation-wide, world-wide service facilities. This rich inheritance is yours only at Fuel Injection Headquarters—AMERICAN BOSCH Corporation, Springfield, Mass.

AMERICAN BOSCH

Fuel Injection STANDARD OF AMERICA WORLD WIDE SERVICE *Equipment*

The SURE way to move dirt PROFITABLY

Heil Dig-N-Carry Hydraulic Scrapers Operating on the Pennsylvania Turnpike

Efficient HEIL Dig-N-Carry Hydraulic Scrapers Insure Profitable Operation

Contractors feel safer, surer when they depend on Heil Dig-N-Carry hydraulic scrapers to maintain dirt moving schedules — Heil scrapers load fast — dump fast — cut and spread accurately — turn in a short radius — hitch and unhitch easily — These operating advantages make it possible to move more dirt per day at less cost per yard — By all means get Heil Dig-N-Carry operating facts and figures before you buy — Write, wire or phone your inquiry to:

THE HEIL CO.

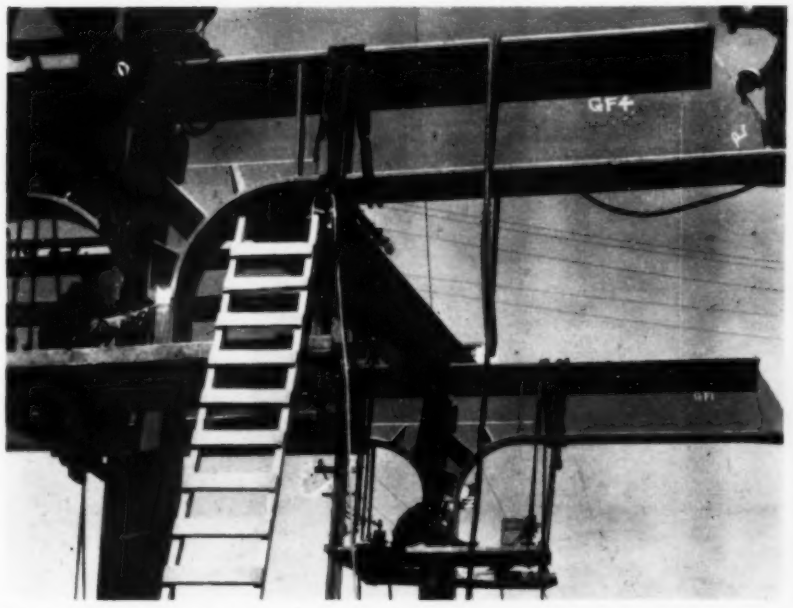
MILWAUKEE, WISCONSIN · HILLSIDE, NEW JERSEY

★ WELDING ★

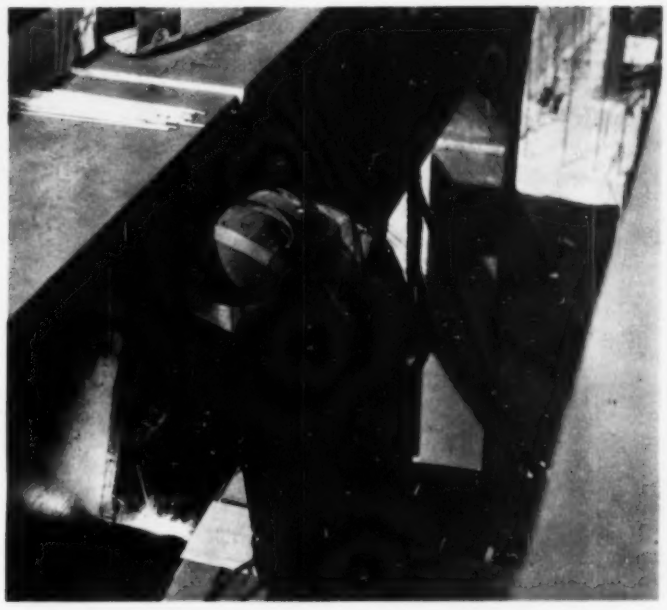
FOR STRONG, LIGHT, RIGID, LOW-COST CONSTRUCTION

On the new Main Avenue Bridge, Cleveland, Ohio

Gen'l Contractors: The R. C. Mahon Co., Detroit, Mich. and The Sam W. Emerson Co., Cleveland, O. (Approaches)



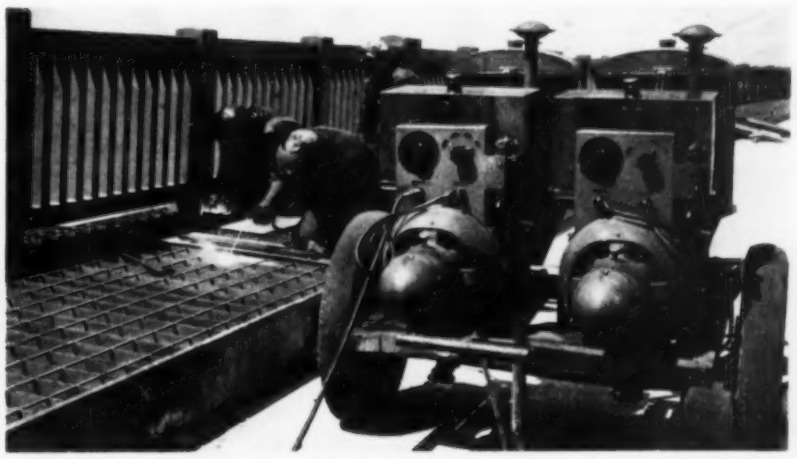
● Erecting column-to-girder connections on one of two 122-foot all-welded overpass spans, west-side approach. Shop-fabricated member includes a 38-ft. length of 36 in. x 300 lb. girder and plate welded into frame as shown. Column is 14 in. x 211 lbs.



● Joining a 46-ft., 36-in. x 300 lb. girder to the end of the shop-fabricated girder frame. Splice plate on bottom flange holds girder in place prior to welding. Flange joints are single V for down-hand welding. Web joint is bevelled on both sides.

Shop fabrication: Mt. Vernon Bridge Co., Mt. Vernon, Ohio
Erection Welding: Bass Construction Co., Cleveland, Ohio

● Considerable overhead welding was required in making beam-to-stringer connections on the overpass spans. Lincoln "Fleetweld 5"—the world's most popular electrode for all-position welding—was used 100%.



● Installing sidewalk flooring. This type of flooring—used throughout the 1½-mile-long bridge—was installed by arc welding. Welded joints throughout bridge total approximately 60 miles. Two of the dozen Lincoln Welders on the job are shown.

Welding by: Great Lakes Welding & Boiler Co., Cleveland, Ohio

FREE to designers, engineers and contractors: "Studies in Structural Arc Welding." Consult the nearest Lincoln office or mail the coupon.

LINCOLN

LARGEST MANUFACTURERS OF ARC WELDING EQUIPMENT IN THE WORLD

THE LINCOLN ELECTRIC CO.,
Dept. G-627, Cleveland, Ohio.

☐ Send "Studies in Structural Arc Welding," as issued.

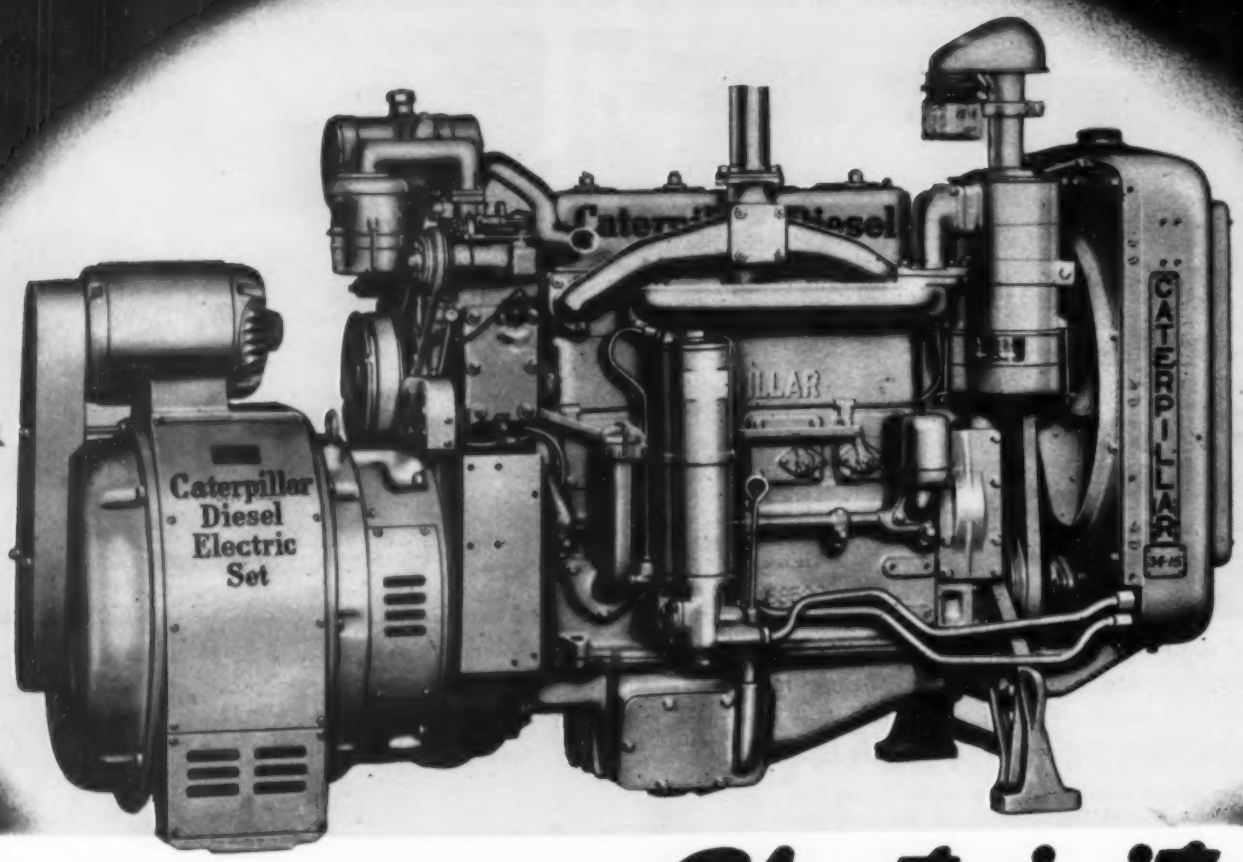
Name _____ Position _____

Company _____

Address _____

City _____ State _____

Two new popular-size "CATERPILLAR"



THAT GENERATE *Electricity at*

FOR flood-lighting operations, camp or bunk-house lighting, refrigeration; for tool-shop, water-supply, welder operating power; for auxiliary or miscellaneous uses in the contracting and engineering fields, no other similar source of electric current combines the dependability, simplicity and economy of these new "Caterpillar" Diesel-Electric Sets. Operate them a few hours a day or all twenty-four; a few months a year or all twelve—use as little or as much as you like, there are no penalties, premiums or "special charges" to pay.

Completely self-contained and self-regulating, these compact plants are easy to locate in small space; easy to start and run; easy to maintain. . . . *And easy to buy!* Set consists of the carefully built, long-lived, performance-tested "Caterpillar" Diesel Engine, direct-connected through special cushioned coupling to quality-constructed "Caterpillar" Generator. Known the world over, this engine is free from frequent and delicate adjustments (absolutely none required on fuel system). Under ordinary care, maintenance costs are trivial, repairs seldom, and long life certain.

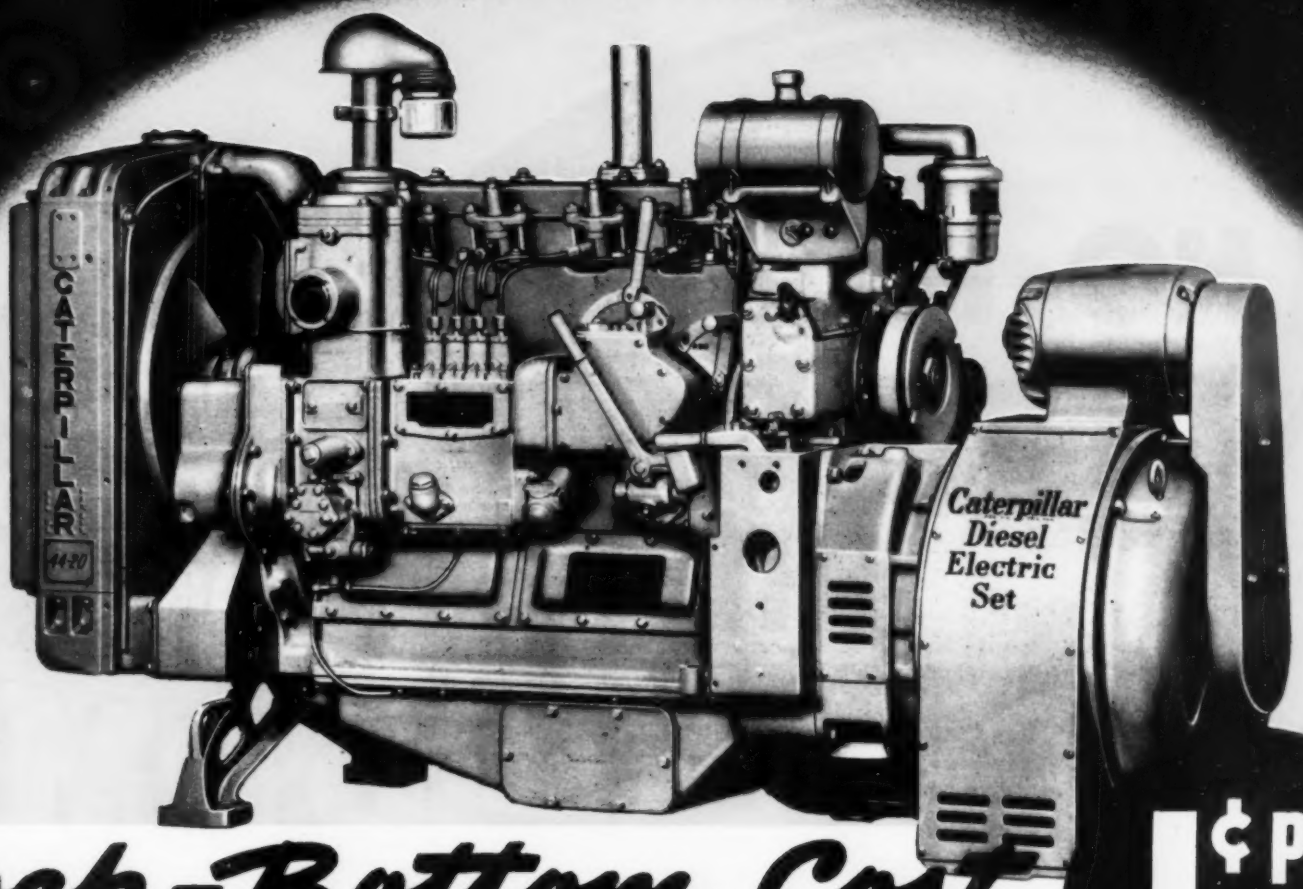
Generator, of sturdy design, is of the double-ball-bearing type and is made for long trouble-free service. Built-in regulation permits starting large motors with only minor light fluctuations. No "gadgets," no complicated controls, no elaborate electrical installation. . . . A simple, low-cost set-up with power as readily available as water from a faucet! See any "Caterpillar" dealer, or write us direct for literature.

**Slightly more or less, depending on local price of Diesel fuel and average loads.*

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

• The 34-15 (*left*)—supplied in 3-phase, 110, 220 or 440 volts at 15 kw. Also in single-phase 110/220 volt 3-wire type, and 110, 220 or 440 volt 2-wire type at 13 kw. • The 44-20 (*right*)—supplied in 3-phase, 110, 220 or 440 volts at 20 kw.

DIESEL-ELECTRIC SETS



Rock-Bottom Cost ¢ per KWH*

CATERPILLAR DIESEL POWER

REG. U.S. PAT. OFF.

DIESEL ENGINES—32 to 160 hp. (max. rating) • DIESEL-ELECTRIC SETS—13 to 90 kw. (continuous rating) • TRACK-TYPE TRACTORS —25 to 97 drawbar horsepower

CATERPILLAR TRACTOR CO., Peoria, Ill.

Please send further information on the new 44-20 and 34-15 "Caterpillar" Diesel-Electric Sets for _____ service.

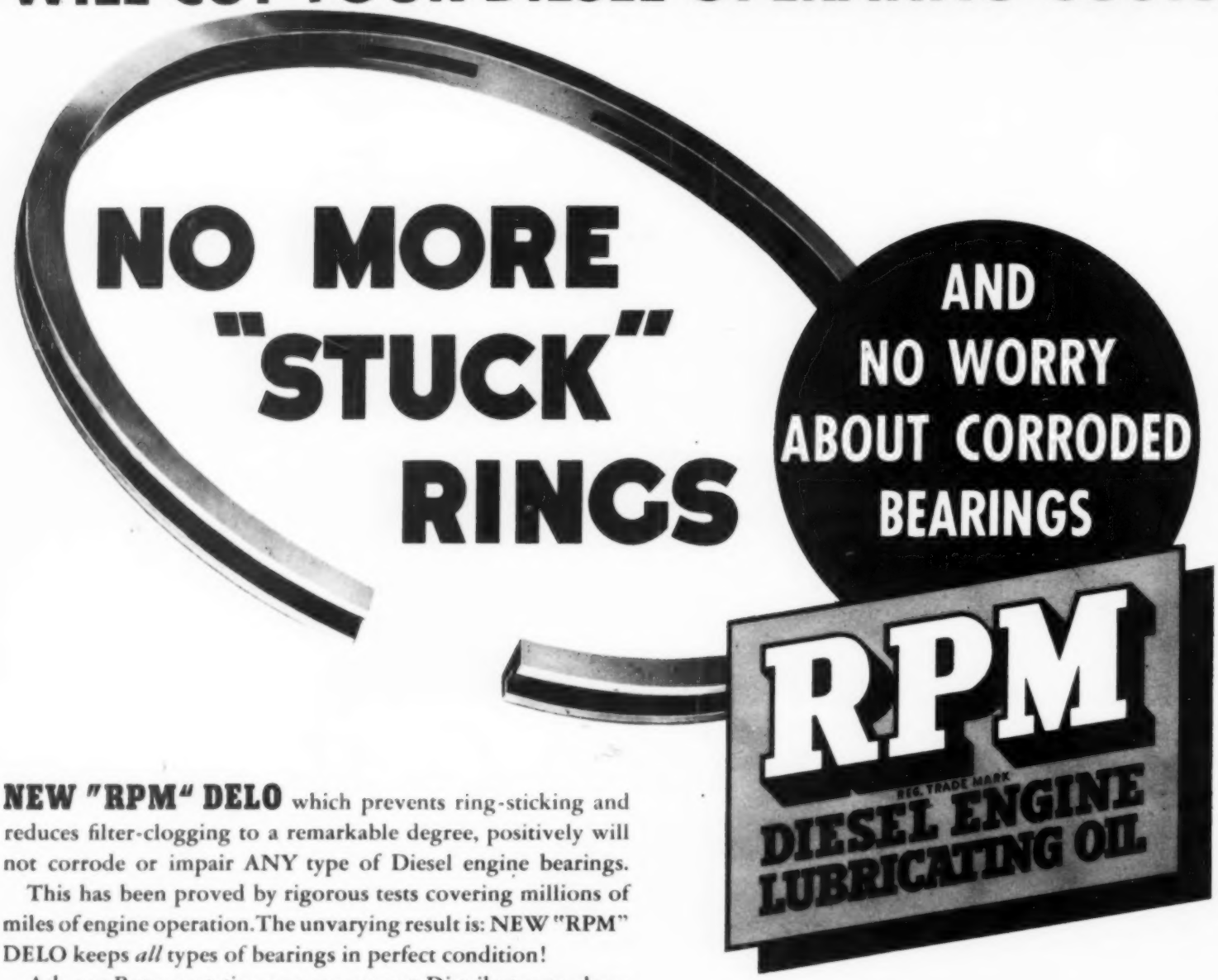
Company _____

Attention of _____

New "RPM" DELO

[Diesel Engine Lubricating Oil]

WILL CUT YOUR DIESEL OPERATING COSTS



NEW "RPM" DELO which prevents ring-sticking and reduces filter-clogging to a remarkable degree, positively will not corrode or impair ANY type of Diesel engine bearings.

This has been proved by rigorous tests covering millions of miles of engine operation. The unvarying result is: NEW "RPM" DELO keeps *all* types of bearings in perfect condition!

Ask our Representative or your nearest Distributor to show you the authoritative Engineers' Report on NEW "RPM" DELO. This gives you the full results of our 10,000,000 miles and 90,000 hours of testing. By every test NEW "RPM" DELO assures clean-engine operation—free rings, clean pistons and cylinders, free oil passages, clean filters. Fact is, in a grueling test with NEW "RPM" DELO, engine filters remained free and unclogged after operating *6 times longer* than was possible with the highest quality straight mineral oil!

Yes, NEW "RPM" DELO spells *absolutely correct lubrication* for every type of Diesel engine, stationary or mobile, ashore or afloat. Cash in on all its service advantages yourself.

NEW "RPM" Diesel Engine Lubricating Oil now available everywhere in the gray barrel with the blue head

ORDER FROM YOUR NEAREST DISTRIBUTOR AS LISTED BELOW:

IN THE UNITED STATES

"RPM" Diesel Engine Lubricating Oil:
The California Company (Montana only)
Humble Oil & Refining Company
Standard Oil Company (Indiana)
Standard Oil Company (Nebraska)
Standard Oil Company of California
Standard Oil Company of Texas
Utah Oil Refining Company

Diol "RPM" Diesel Engine Lubricating Oil:
The Carter Oil Company
Tulsa, Oklahoma
Colonial Beacon Oil Company
Standard Oil Company of Louisiana
Standard Oil Company of New Jersey
Standard Oil Company of Pennsylvania

Kyso "RPM" Diesel Engine Lubricating Oil:
Standard Oil Company (Inc. in Kentucky)

Signal "RPM" Diesel Engine Lubricating Oil:
Signal Oil Company

Sohio "RPM" Diesel Engine Lubricating Oil:
The Standard Oil Company (Ohio)

IN CANADA

"RPM" Diesel Engine Lubricating Oil:
Imperial Oil Company Limited
Standard Oil Company of British Columbia Limited

THROUGHOUT THE WORLD

"RPM" Diesel Engine Lubricating Oil is also available through distributors in more than 100 other countries. Get in touch with your nearest distributor.

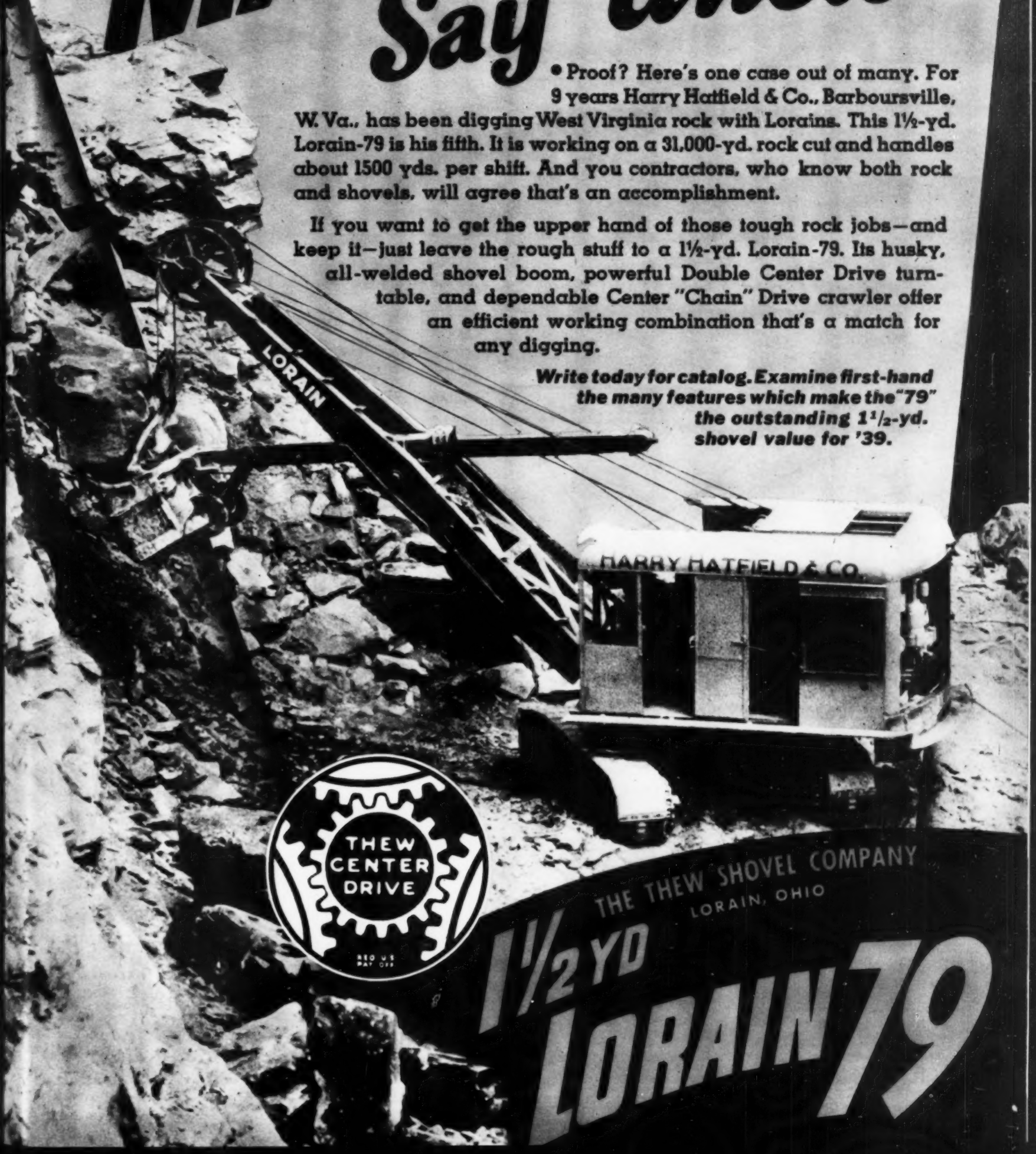
STANDARD OIL COMPANY OF CALIFORNIA

MAKES ROCK Say "Uncle"

• Proof? Here's one case out of many. For 9 years Harry Hatfield & Co., Barboursville, W. Va., has been digging West Virginia rock with Lorains. This 1½-yd. Lorain-79 is his fifth. It is working on a 31,000-yd. rock cut and handles about 1500 yds. per shift. And you contractors, who know both rock and shovels, will agree that's an accomplishment.

If you want to get the upper hand of those tough rock jobs—and keep it—just leave the rough stuff to a 1½-yd. Lorain-79. Its husky, all-welded shovel boom, powerful Double Center Drive turntable, and dependable Center "Chain" Drive crawler offer an efficient working combination that's a match for any digging.

Write today for catalog. Examine first-hand the many features which make the "79" the outstanding 1½-yd. shovel value for '39.



How World-Famous LAPLANT-CHOATE BULLDOZERS

Help You Increase Production and Profits

Hydraulic Control

Gives you smooth, easy, finger-tip control. Blade can be rigidly locked in any position and you are assured of positive down pressure for digging. This all-purpose Bulldozer helps you make work easier . . . more profitable.

- **Now Available with Hydraulic or Cable Operated Controls**

Here is a rugged, dependable, highly versatile piece of equipment that is a profit-maker on any job — large or small. A LaPlant-Choate Bulldozer pays you a dividend on small jobs because it takes care of them quickly and at low cost. And on the big, tough jobs it has the power and stamina to work continuously at peak capacity.

For digging, leveling, spreading, filling and many other pieces of work the dependable, scientifically designed LaPlant-Choate Bulldozer consistently moves *more yards at lower cost*. Designed for use exclusively on "Caterpillar" Track-type tractors, these Bulldozers give you a well-balanced, highly coordinated unit that has set a remarkable record for low maintenance cost. Avoid losing time and money with slow inefficient, out-of-date equipment. Modernize now with LaPlant-Choate Bulldozers.

"Caterpillar" Cable Control Units

This new addition to the LaPlant-Choate line gives you a slightly lower initial cost. In quality, this machine takes its place beside any piece of equipment in our line. And in performance, it will handle any job suitable for a cable controlled unit.

Let your LaPlant-Choate and "Caterpillar" dealer help you select the Bulldozer best suited to your needs. See him right away. Write today for Free literature.

TRAIL BUILDERS
SNOW PLOWS
TAMPING ROLLERS
TREEDOZERS

BRUSH CUTTERS
RUBBER WHEEL WAGONS
CARRIMOR SCRAPERS

LA PLANT-CHOATE MANUFACTURING CO. Inc.

CEDAR RAPIDS, IOWA.

PENNSYLVANIA TURNPIKE CONTRACTORS

Extend Carryall Savings*

over 30% greater work range

Because LeTourneau Carryall Scrapers have established every known low cost-per-yard *excavation and placement record*, what an edge a contractor has when he can spread those costs over material usually considered shovel and truck work!

Rooters* give perfect breakage for fast, effortless Carryall loading in any tough material. They save from 20% to 40% loading time . . . and increase pay yards per load as much as 50%. On the short hauls, LeTourneau 'Dozers — worked in combination with the Rooter — save Carryall time. In addition, they trim the slopes . . . keep the cuts clean . . . help yank out huge boulders.

To specialize in making all jobs profitable with the smallest possible equipment investment, standardize on LeTourneau *mechanically* controlled tools. They're interchangeable on any LeTourneau Power Control Unit . . . each standardizes on the same size cable . . . which aids in making savings *permanent*.

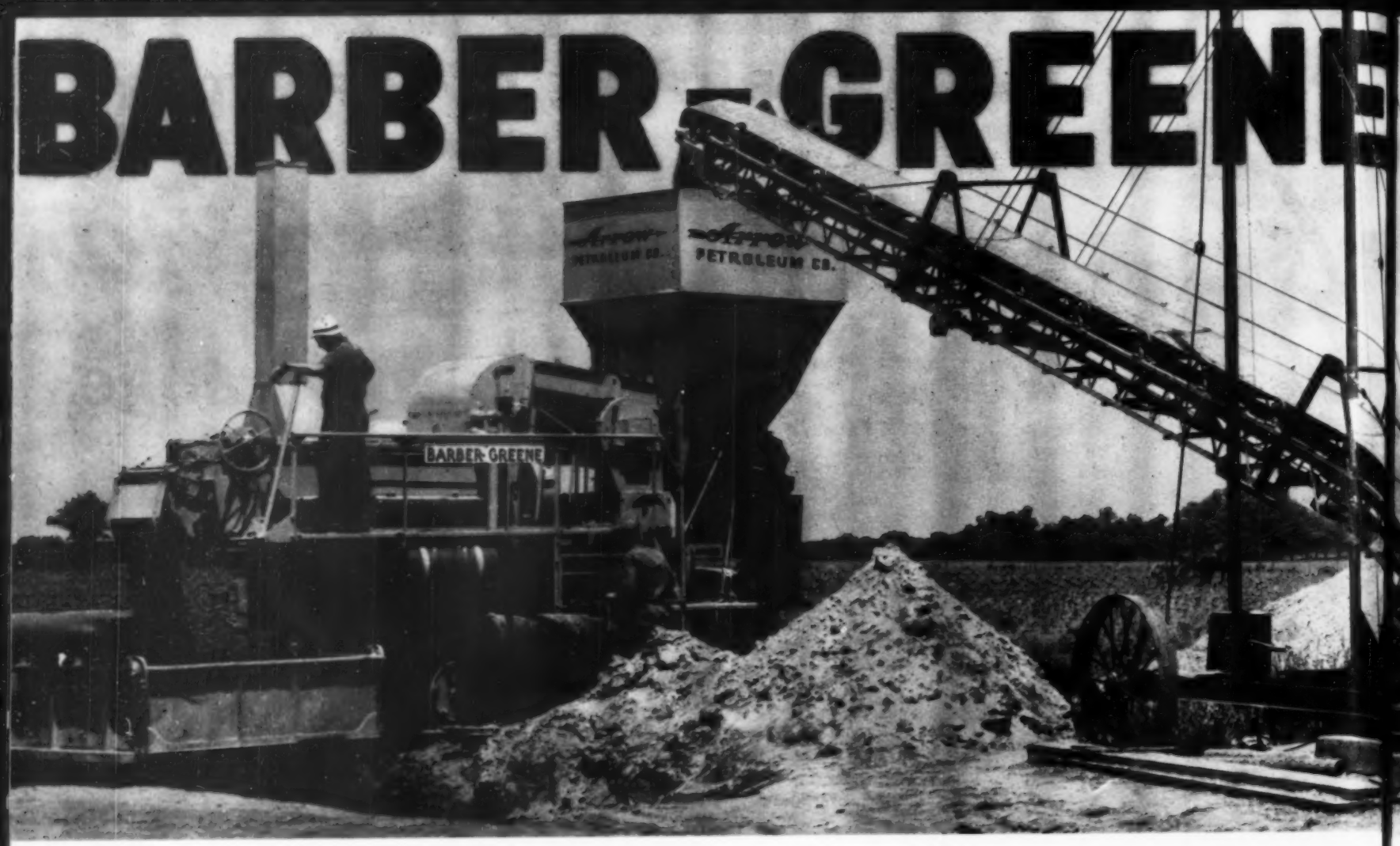
For an "edge" in today's and tomorrow's bidding, ask your LeTourneau and "Caterpillar" dealer to demonstrate *on your job!* R. G. LeTOURNEAU, INC., Peoria, Illinois; Stockton, California. Cable address: "Bobletorno"

LETOURNEAU

ROOTERS* 'DOZERS CARRYALLS*

POWER CONTROL UNITS, DRAG SCRAPERS, PUSHDOZERS, SHEEP'S FOOT ROLLERS, CRANES, TREEDOZERS.

BARBER-GREENE



THIS is a typical low cost, high capacity Barber-Greene Bituminous Drying, Mixing, and Finishing Plant. You'll be interested in the essential facts listed below:

Contractor—Arrow Petroleum Company, Chicago, Ill.

Job — Paving road north of Barrington, Illinois. 3½ miles long, 20 feet wide, 2⅝" thick.

Actual Plant Production—125 Tons Per Hour.

EQUIPMENT AND LABOR

Machines	Operators	Laborers
1—¾ Yard Clam Shell	1	0
1—Barber-Greene Reciprocating Feeder 1—Barber-Greene Bucket Elevator 1—Barber-Greene Dual Drum Dryer 1—Boiler 1—Barber-Greene 60' Portable Conveyor 1—Barber-Greene Mixer	2	2
1—Barber-Greene Tamping Leveling Finisher	2	1
1—Roller	1	0
TOTALS	6	3

The above tabulation does not include trucks or drivers for delivering materials to the plant, or for hauling the mix from the plant to the Finisher. This equipment varies, depending upon the length of haul.

Type of Mix — Illinois C-6 Specification using dense graded aggregate from 1" to 200 mesh, adding 4.42% RT-7 Tar at 170° F.

Drying—Removing 5% moisture from aggregate at 125 tons per hour.

Cooling—Aggregate cooled to 180° F. by B-G Conveyor prior to mixing.

MOBILITY—The B-G units are built to be moved from one job to another with the least time and expense. This has been most successfully accomplished by having all of the units complete, independent assemblies that may be moved easily with practically no knocking down. Setting up the plant like the one above is chiefly a matter of arranging the units. Pneumatic tires on the Dryer and Mixer greatly facilitate the moving operation.

VERSATILITY—The owner of this B-G Equipment is not restricted to any type of mix or set-up.

He has the basic equipment for every type of bituminous and stabilizing job.

For the high type mixes, bituminous concrete, etc., he can add B-G screen and bin control equipment for separately handling and separately proportioning the different sizes of graded aggregates.

PERFORMANCE *Facts*

In combination with a B-G Bucket Loader, he can operate as a Travel Plant on all types of bituminous work, including: Tars; RC, MC, and SC Cut-back Asphalts; Emulsions; as well as all types of stabilization, including: Clay, Salt, Emulsion, Tar, Asphalt, Cement.

B-G MIXER—Backed up by approvals and enviable records of 83 machines sold in the past few years, the Barber-Greene Mixer is thoroughly established as the outstanding machine for high capacity, high portability, low cost operation, and close control.

B-G FINISHER—The Barber-Greene Tamping Leveling Finisher has set new standards of excellence for bituminous paving. This machine, probably the most ingenious design in the road building industry, has been manufactured on a production schedule for the past two years.

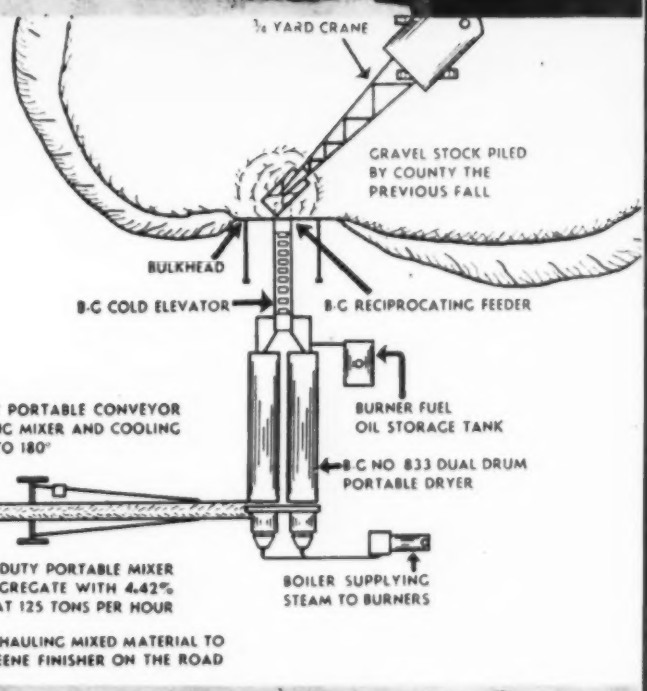
B-G DUAL DRUM DRYER—This, the newest Barber-Greene, completes the B-G line of bituminous equipment. Having undergone close observation in the field for over a year, this new unit is now released. Its combination of high capacity and high portability is accomplished by two parallel drums of comparatively shorter length and smaller diameter, splitting the volume to be dried, and getting a higher drying efficiency.

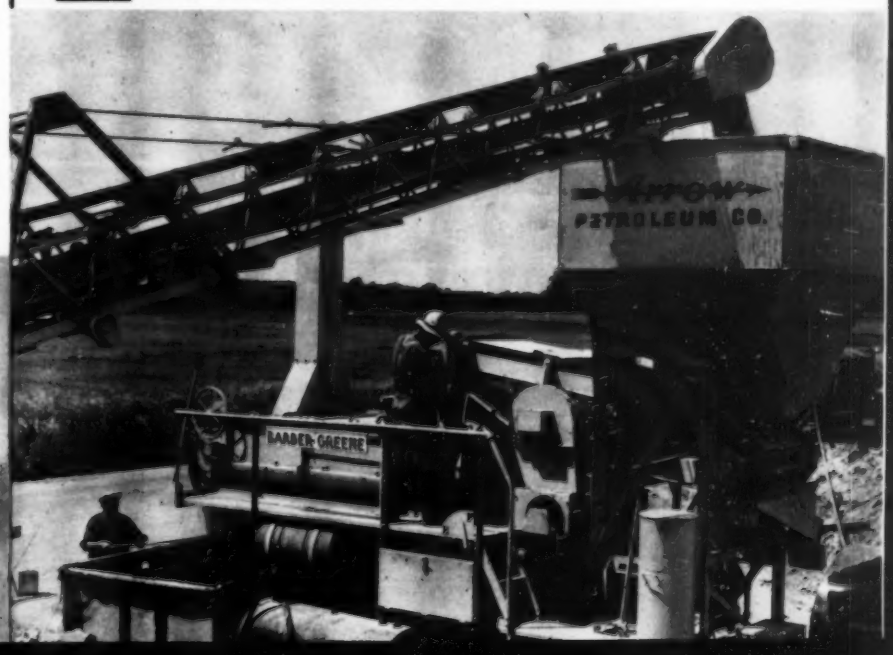
Literature on all of these Barber-Greenes will be sent on request. Phone, write, or wire. There is no obligation.

BARBER GREENE

AURORA, ILLINOIS 39-25

Below: B-G Mixer operating with B-G Bucket Loader as Travel Plant.





11 MODELS IN FOUR SIZES

TWO 3/8 YD. MODELS
Bearcat Jr. . . . . 15,000 lbs.
Model 55 . . . . 25,000 lbs.

TWO 1/2 YD. MODELS
Model 60 . . . . 28,400 lbs.
Model 65 . . . . 30,000 lbs.

ONE 5/8 YD. MODEL
Model 75 . . . . 32,000 lbs.

TWO 3/4 YD. MODELS
Model 83 . . . . 36,000 lbs.
Model 80 . . . . 48,000 lbs.

ALSO FOUR TRUCK CRANES AND SHOVELS
Gas or Diesel Power

He Can't Act
BUT HE MAKES ACTORS FAMOUS

● Millions thrill to a great motion picture, acclaim its actors as stars, but few have seen the man behind the scenes who made the actors famous. He is the director whose skill and knowledge and understanding of his job brings him credit for producing a great picture. The director is a specialist.

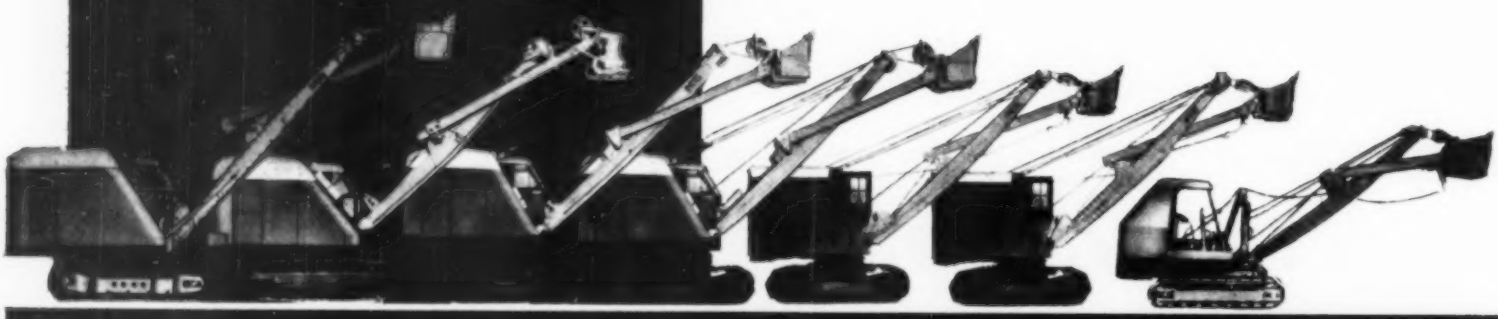
This is an age of specialization.

That's why The Byers Machine Co. specializes. Byers builds only the portable sizes of shovels and cranes. Years of experience in building 3/8, 1/2, 5/8 and 3/4 yd. sizes has brought Byers a world-wide reputation for producing great excavators.

Byers engineers and production men understand the special requirements for 3/8 to 3/4 yd. machines. They have developed a current line of 11 up-to-date models in these 4 sizes.

You'll be able to choose from several models in a size at Byers. Each is designed with special features that increase daily output, add to long useful life, reduce service expense.

If you are not up-to-date on Byers line, then you don't know all the extra values you can get in 3/8 to 3/4 yd. portable shovels, cranes, draglines, trench hoes or skimmers. Why not investigate today?



BYERS

SHOVELS • CRANES • DRAGLINES • TRENCH HOES

THE BYERS MACHINE CO., RAVENNA, O.
Distributors throughout the World

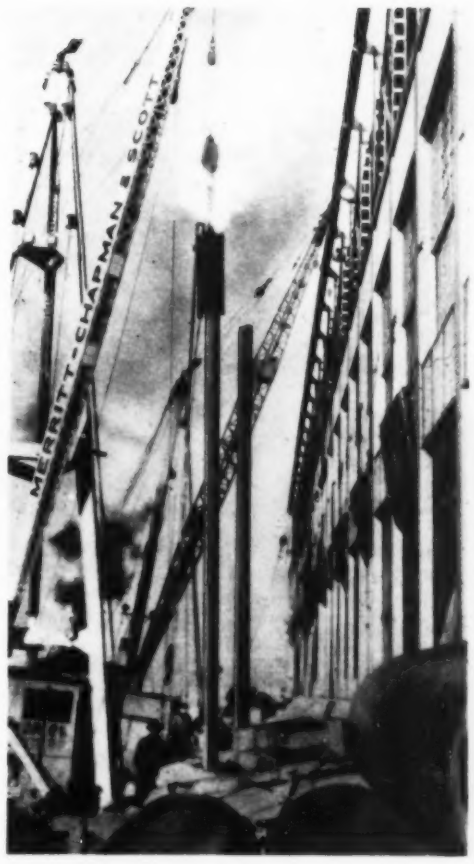
SPECIALIZING IN 3/8 • 1/2 • 5/8 • 3/4 YD. MODELS

4 Million Feet of FOUNDATION SAFETY!

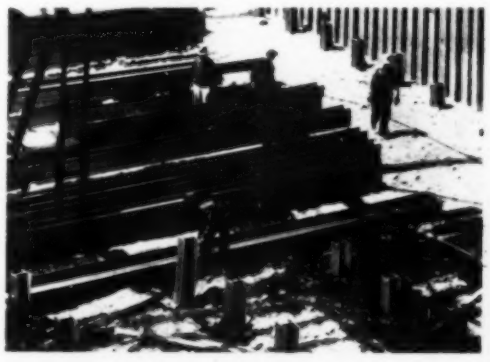
SINCE January 1935, approximately 750 miles of U·S·S Steel Bearing Piles have been driven to ensure lasting safety and economy on 384 projects. Large jobs and small jobs. Fresh water and salt water. Under buildings, bridges, viaducts, dams, piers and docks. The longest single length pile ever driven—128′6″—is a U·S·S Bearing Pile in the foundation of Boston's Commonwealth Pier (Fig. 3). U·S·S Steel Bearing Piles set a world's record as the largest lineal footage, 929,245 lin. ft., ever driven on a single undertaking (Fig. 5).

Whether conditions are usual or out-of-the-ordinary, these easily driven U·S·S Steel Bearing Piles are money-savers. Their capacity for high unit loads, both vertical and horizontal, permits fewer piles and driving operations for a given load. Contractors tell us that they are easily handled in the field by ordinary equipment—are easy to splice, withstand rough handling, eliminate jetting, require less shipping and storage space.

It will pay you to investigate U·S·S Steel Bearing Piles for all your projects—especially where the conditions are unusual. They are available from an unfailing source of supply that makes them immediately obtainable, regardless of the size of the job or its location. Call freely upon the specialized experience of our engineers.

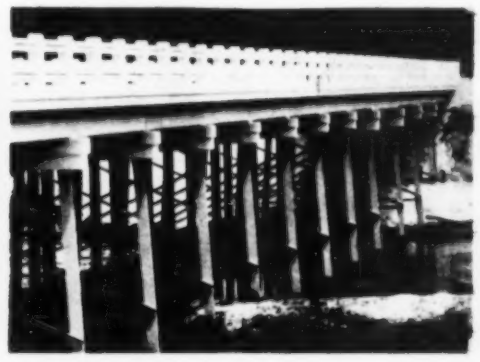


DEEP PENETRATION—HEAVY LOADING. Into the ocean floor under Boston's biggest pier goes 58,000 feet of U·S·S Steel Bearing Piles, in lengths up to 137′. In a 24-hour 121-ton load test an 85′ pile settled only 5/16″ and recovered to within 1/32″ of original elevation.



HORIZONTAL LOAD RESISTANCE. In addition to heavy vertical loading, 6 tons of lateral loading per pile must be safely carried by the foundations for Emsworth Dam on the Ohio River. Engineers chose U·S·S CBP Steel Bearing Piles because of their high resistance to combined stresses. They proved practical and easy to drive.

BIG TONNAGE—"ON-TIME" DELIVERIES. 8,121 U·S·S Steel Bearing Piles support the foundation of the Ford Motor Company's new press plant at River Rouge. Approximately 1600 tons of these sections, in single lengths up to 105 ft., were shipped weekly to ensure rapid progress and on-time completion of this important foundation job.



DOUBLE PURPOSE. Note the perfect alignment and simplicity of this trestle in Clay County, Florida. Here is an effective double-purpose design. U·S·S Steel Bearing Piles act both as bearing piles and trestle bent columns. To withstand flood-borne loads and impacts and lateral shocks, experience dictates the choice of U·S·S Steel Bearing Piles.

USS

STEEL BEARING PILES

CARNEGIE-ILLINOIS STEEL CORPORATION

Pittsburgh and Chicago

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*

United States Steel Products Company, New York, *Export Distributors*

Look for this symbo on steel products. It represents the highest quality, the finest metallurgical service.

UNITED STATES STEEL

Better Roads

Go Right Down the Middle

(*In this case the middle of a swamp*) *with* ATLAS Fill Settlement Methods

Highway construction between Kissimmee and Haines City, Florida.

Preparing the blast. Note unique loading device at left.

After one shot. Fill has settled.

"Fill settlement" with Atlas Explosives makes possible many a permanent road, over swampy territory.

For a long time, swamps presented a tough problem in highway construction. Roads had to be "floated" across or "take to the hills." Wavy or winding roads over higher cost right-of-way resulted.

The problem was solved by using explosives to settle the highway fill. In this development, as in so many others involving explosives, Atlas methods and Atlas Explosives have made outstanding contributions.

Make it a point to call the Atlas representative whenever *you* meet a problem in using explosives.

ATLAS POWDER COMPANY, WILMINGTON, DEL.

Cable Address—Atpowco

Everything for Blasting

OFFICES

Allentown, Pa.	Houghton, Mich.	New Orleans, La.	Pittsburgh, Pa.	Spokane, Wash.
Boston, Mass.	Joplin, Mo.	New York, N. Y.	Portland, Oregon	St. Louis, Mo.
Butte, Mont.	Knoxville, Tenn.	Philadelphia, Pa.	Salt Lake City, Utah	Tamaqua, Pa.
Chicago, Ill.	Los Angeles, Calif.	Picher, Okla.	San Francisco, Calif.	Wilkes-Barre, Pa.
Denver, Colo.	Memphis, Tenn.	Pittsburg, Kansas	Seattle, Wash.	

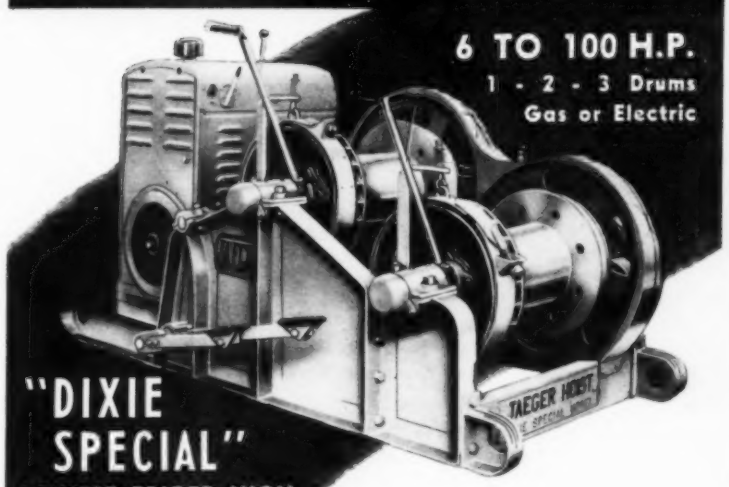
ATLAS

EXPLOSIVES

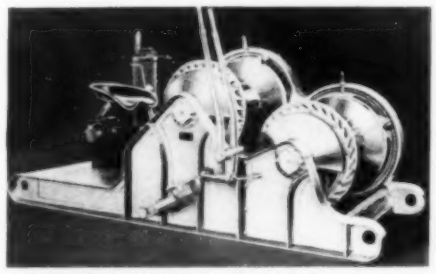
CHEMICALS ATLAS EXPLOSIVES

The Leading Hoist Today is JAEGER

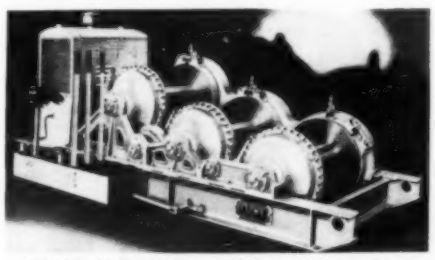
. . Get Jaeger Improvements, Jaeger Prices . . . When You Buy



Two years ago Jaeger introduced the first modern hoist — with Giant Expanding Frictions or Clutches giving sure, easy "touch control," with Anti-Friction Bearings replacing babbit or bushings, with Combined All-Steel Side Frames and Base (50% stronger, hundreds of pounds lighter), with Smoother Power —all at low prices made possible by simplified mass production of standard units. Today Jaeger Hoists, 6 to 100 H.P., are the recognized leader. Send coupon below for Catalog explaining Jaeger improvements and Jaeger's low prices on all sizes of builders hoists.



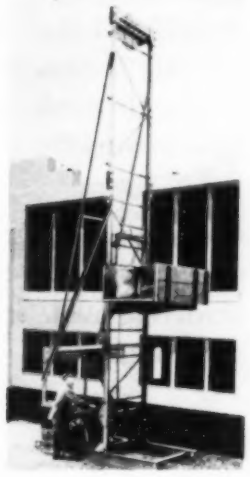
36-50 H.P. "Utility" Hoists—with "Touch Control," Combined Side Frames and Base, Anti-Friction Bearings.



55-100 H.P. "Heavy Duty" Hoists—Giant Expanding Frictions Give "Touch Control" of Loads—Most Advanced Type on Market.

12 H.P. "HOISTER" WITH SELF-RAISING TOWER

Self-raising. Skids around job. Full ton capacity — 37 ft. high.



THE JAEGER MACHINE COMPANY
800 Dublin Avenue, Columbus, Ohio

Gentlemen: Send latest Catalog H-39 and prices on Hoists, Towers (30 to 500 Ft.) and Placing Equipment.
We are also interestd in ☐ MIXERS ☐ PUMPS

Name _____

Address _____

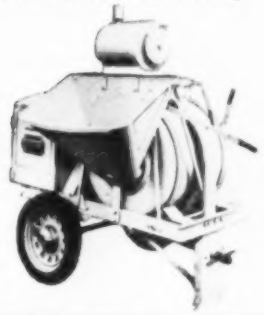
JAEGER'S LATEST ~~SPEEDLINE~~

End Discharge 7S to 14S Trailers

Again the world's biggest mixer manufacturer puts you a long jump ahead — gets you to your 1939 jobs faster, saves you 50% street room, starts you pouring quicker, steps up your daily yardage with a modern designed speed mixer — the fastest, easiest handling, lightest yet huskiest mixers Jaeger has ever built. These 1939 Speedlines are not to be compared with flimsy "lightweight" mixers, tho they sell at outstandingly low prices. Get Catalog.

2 or 4-WHEEL MOUNT, INTERCHANGEABLE

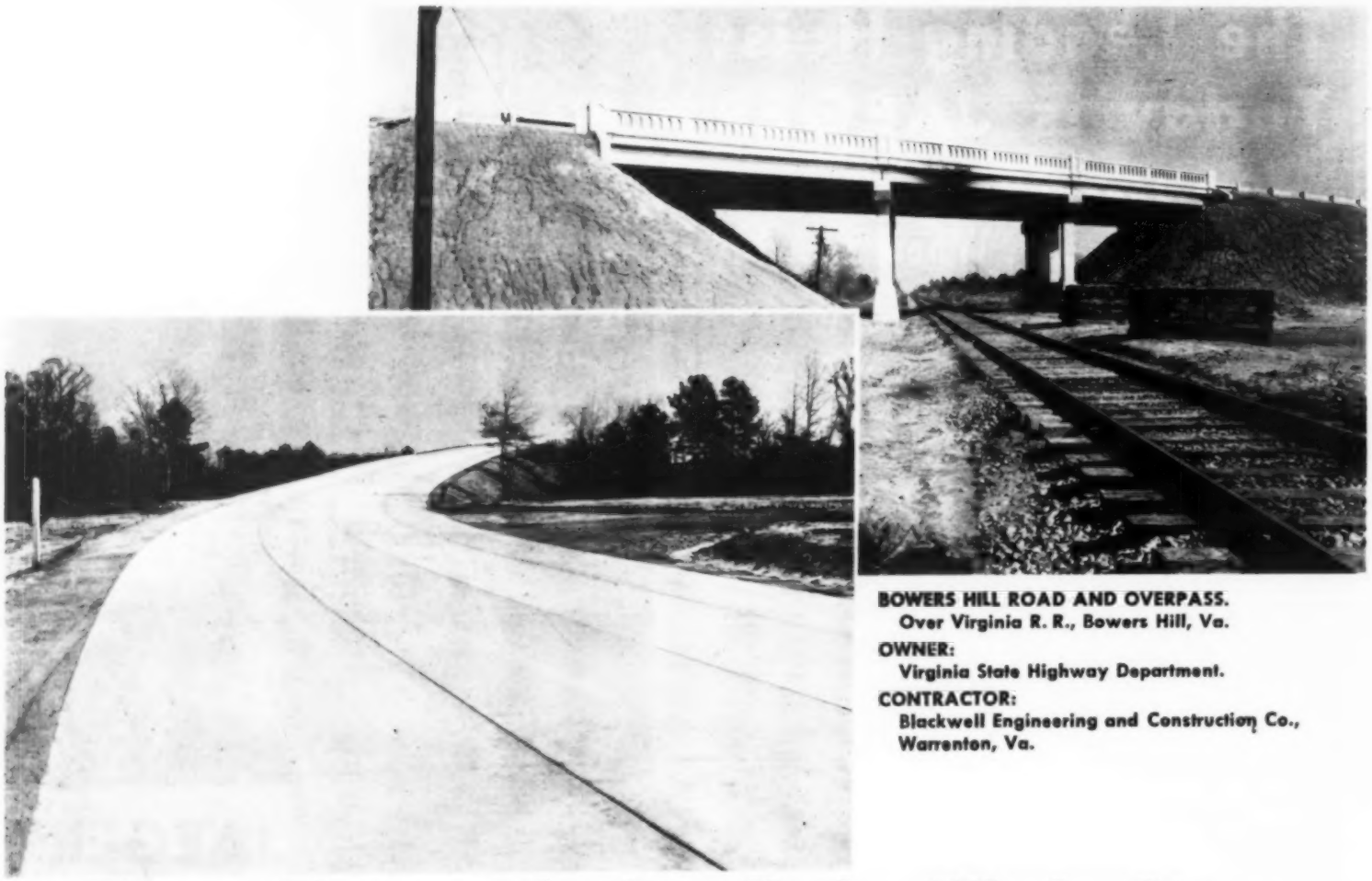
Machined Steel Drum Tracks Not Found in "Lightweights." Bigger Engines, Bearings, etc. Skip Shaker Loader "Pressure" Discharge Criss-Cross "Re"-Mixing Springs, Timkens and Pneumatics for Fast Trailing



UTILITY MIXER WITH FAST MEASURING BATCH HOPPER

Load while you mix and discharge — get up to 40 cu. yds. a day, all most jobs can handle. Costs hundreds of dollars less than heavy 5S Non Tilts. Get our figures.

THE JAEGER MACHINE CO.
800 DUBLIN AVE. • • • COLUMBUS, OHIO
PUMPS—HOISTS—TOWERS—PAVING EQUIPMENT



BOWERS HILL ROAD AND OVERPASS.
Over Virginia R. R., Bowers Hill, Va.
OWNER:
Virginia State Highway Department.
CONTRACTOR:
Blackwell Engineering and Construction Co., Warrenton, Va.

These Figures don't tell the Whole Story

NATURALLY contractors like the money savings of quick service concrete made with Lehigh Early Strength Cement. But that isn't all. They like the time saving, because they can quickly release equipment and labor for other work. They like it because it is a safeguard in cold weather. They like it because satisfied customers are a big help in getting more business.

On this job, the contractor used Lehigh Early Strength to excellent all-around advantage for himself and the public he was serving. He used it in the structure, and only 5 days after pouring the concrete he started fills around abutments. He used it on the floor slabs, and only 5 days after pouring the last span traffic was turned over the bridge.

Such facts and money savings are good reasons why more and more contractors use Lehigh Early Strength Cement for all their concrete. The fine quality dense concrete made with it cures to service strength in 24 to 48 hours, as compared with 7 days for normal cement.

This speed can be applied to advantage both summer and winter for any type of work, road, bridge, or building construction. The Lehigh Service Department will be glad to answer any questions.

SAVINGS

Form Lumber	$300.00
Labor . . .	100.00
Curing Costs	150.00
Overhead. .	300.00
	$850.00

LEHIGH PORTLAND CEMENT COMPANY, Allentown, Pa. Chicago, Ill. Spokane, Wash.

J&L *Precisionbilt* GILMORE WIRE ROPE HELPS KEEP YOUR SHOVELS ON THE JOB – WORKING ECONOMICALLY

J& L Gilmore Wire Rope assures economical and efficient digging and loading operations — because it has the strength, flexibility and abrasion-resistance to stand up under long, continuous service.

Made of J& L Controlled Quality Steel on the world's newest wire rope making machines — which work to a tolerance of 1/1000 of an inch — Precisionbilt wire rope has toughness and uniformity which account for its long life and wear-resisting qualities.

Every strand is perfectly lubricated by a new scientific process.

When you are making wire rope replacements on your shovels, buckets and drags, or when you order new equipment, specify J& L Precisionbilt. Write today for our wire rope catalog.

J & L — PILOTS THE COURSE OF CONTROLLED QUALITY IN STEEL

JONES & LAUGHLIN STEEL CORPORATION

AMERICAN IRON AND STEEL WORKS

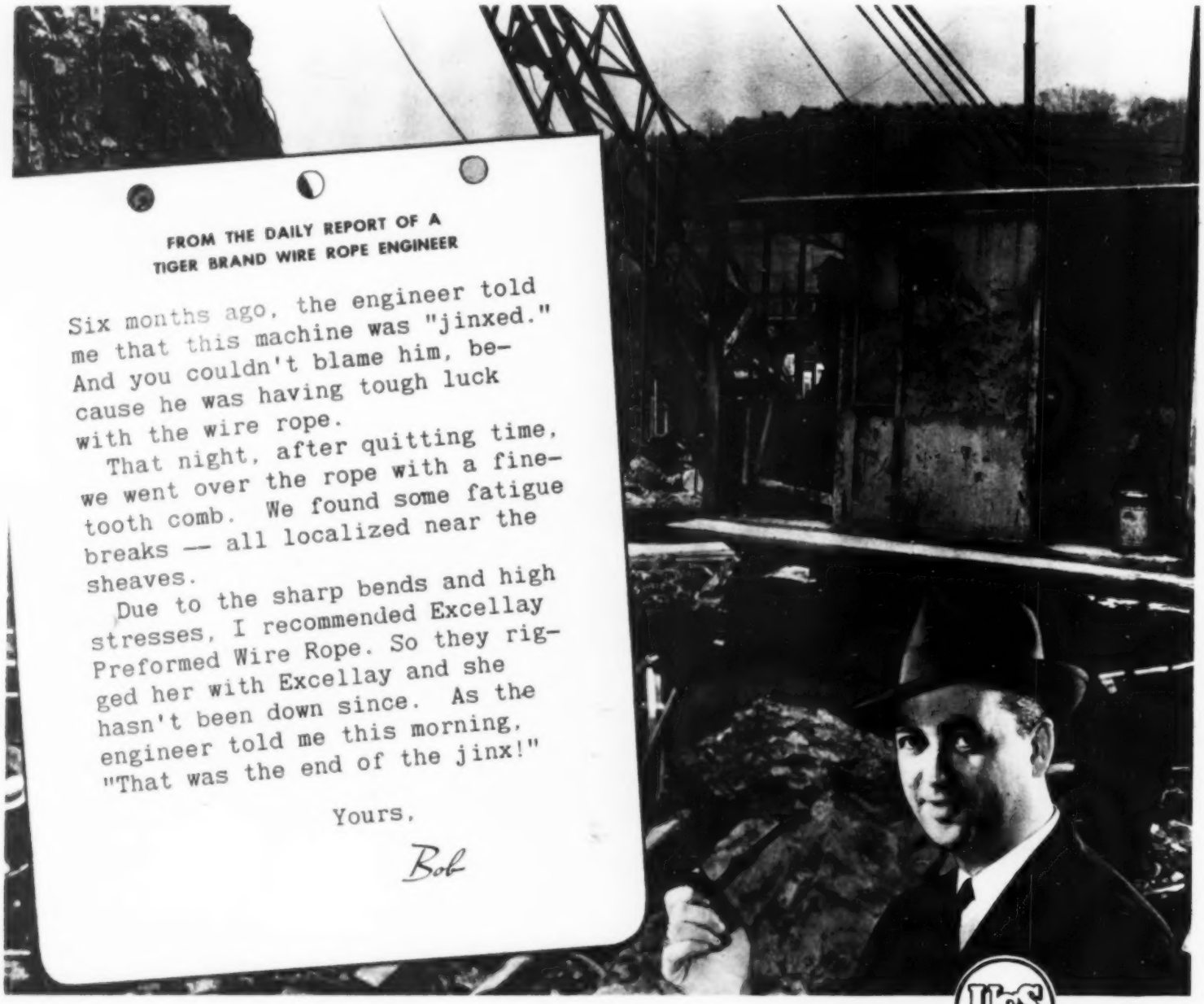
GILMORE WIRE ROPE DIVISION

PITTSBURGH, PENNSYLVANIA

J&L STEEL

J & L — PARTNER IN PROGRESS TO AMERICAN INDUSTRY

. . . SO THEY RIGGED HER WITH EXCELLAY AND ENDED THE JINX!



FROM THE DAILY REPORT OF A
TIGER BRAND WIRE ROPE ENGINEER

Six months ago, the engineer told me that this machine was "jinxed." And you couldn't blame him, because he was having tough luck with the wire rope.

That night, after quitting time, we went over the rope with a fine-tooth comb. We found some fatigue breaks — all localized near the sheaves.

Due to the sharp bends and high stresses, I recommended Excellay Preformed Wire Rope. So they rigged her with Excellay and she hasn't been down since. As the engineer told me this morning, "That was the end of the jinx!"

Yours,

Bob

NO one could be better qualified to help you get real performance out of wire rope than the American Tiger Brand Wire Rope Engineers. For besides knowing wire rope, inside and out, these men know exactly what punishment it has to take on construction jobs. Putting the right type of rope where it will do the most good is no trick to them, because they spend most of their time doing just that.

The result: When you turn your wire rope problems over to them, you get the most practical solution—and what's more, you get it in a hurry.

Be sure to take full advantage of the wide experience of these engineers. They can help you out of many a tight spot, with just the kind of service you need. American Tiger Brand Wire Rope is made in all constructions and grades — every one just as high in quality and technically sound as the men who represent this product.

EXCELLAY *Preformed* **WIRE ROPE**

AMERICAN STEEL & WIRE COMPANY
Cleveland, Chicago and New York

COLUMBIA STEEL COMPANY
San Francisco

United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

NOVO Pumps & Hoists

Far In Advance

Far in advance have Novo pumps leaped, leading the field in new features and in performance.

Never before have there been so many features added to a pump line — Self-priming Centrifugals that are Self-Sealed (no air seals on the impeller shaft) — The old dependable Novo Diaphragm Pumps redesigned for even greater efficiency and easy handling.

Pressure Pumps and Road Pumps that have no equal.

Look at the smooth-lined, smooth-operating Novo 4" Self-priming Centrifugal Pump, it's one of the new Model "K" line which are all rated in accordance with the A. G. C. standards and bear the A. G. C. Standard Plates — your guarantee of honest, adequate volume and head. The contractors have rated Novo Pumps.

Send for your catalog.

(Below) The new 4" Novo "Lift and Force" Diaphragm Pump, which is a regular mud-hog. It is pumping dirty, muddy water laden with debris which can be handled by no other type of pump. Novo Diaphragms also bear the standard A. G. C. Plates, the contractor's vote of confidence.

Send for literature.

(Above) Novo Hoists have been the standard of the industry for years. The dependable, fool-proof leaders for all hoisting work on material elevators, concrete buckets, pile driving, steel placing, drag-line work, etc.

Furnished gasoline, electric and Diesel powered.

Send for literature.

SEND THIS COUPON

NOVO ENGINE CO., 214 Porter Street, Lansing, Mich.
I want full information on the:

- Novo Self-priming Cent. Pump —
- Novo Diaphragm Pumps —
- Novo Pressure Pumps —
- Novo Road Pumps —
- Novo Hoists —

NAME

ADDRESS

CITY STATE

NOVO ENGINE COMPANY

LANSING, MICHIGAN

"50,000 YARDS OF MATERIAL Without Any Expense for Parts!"

O. D. Welden Town Superintendent of Highways Potsdam, New York

● It takes a lot of passes to pile up 50,000 yards with a 3/8 yd. shovel . . . in fact, that's 106,255 full dipper loads! Most machines would require replacement parts during or after a job like that, but not a penny was spent for parts on this P&H Bantam Weight. Even the original hoist cable was still in use. The greater strength and rigidity of P&H machines are the results of all welded construction of tough alloy steels —the design originated by P&H more than 5 years ago and which is now "5 years ahead of the field."

Write for literature on the size and type that interest you. Address the Harnischfeger Corp., 4494 W. National Avenue, Milwaukee, Wisconsin.

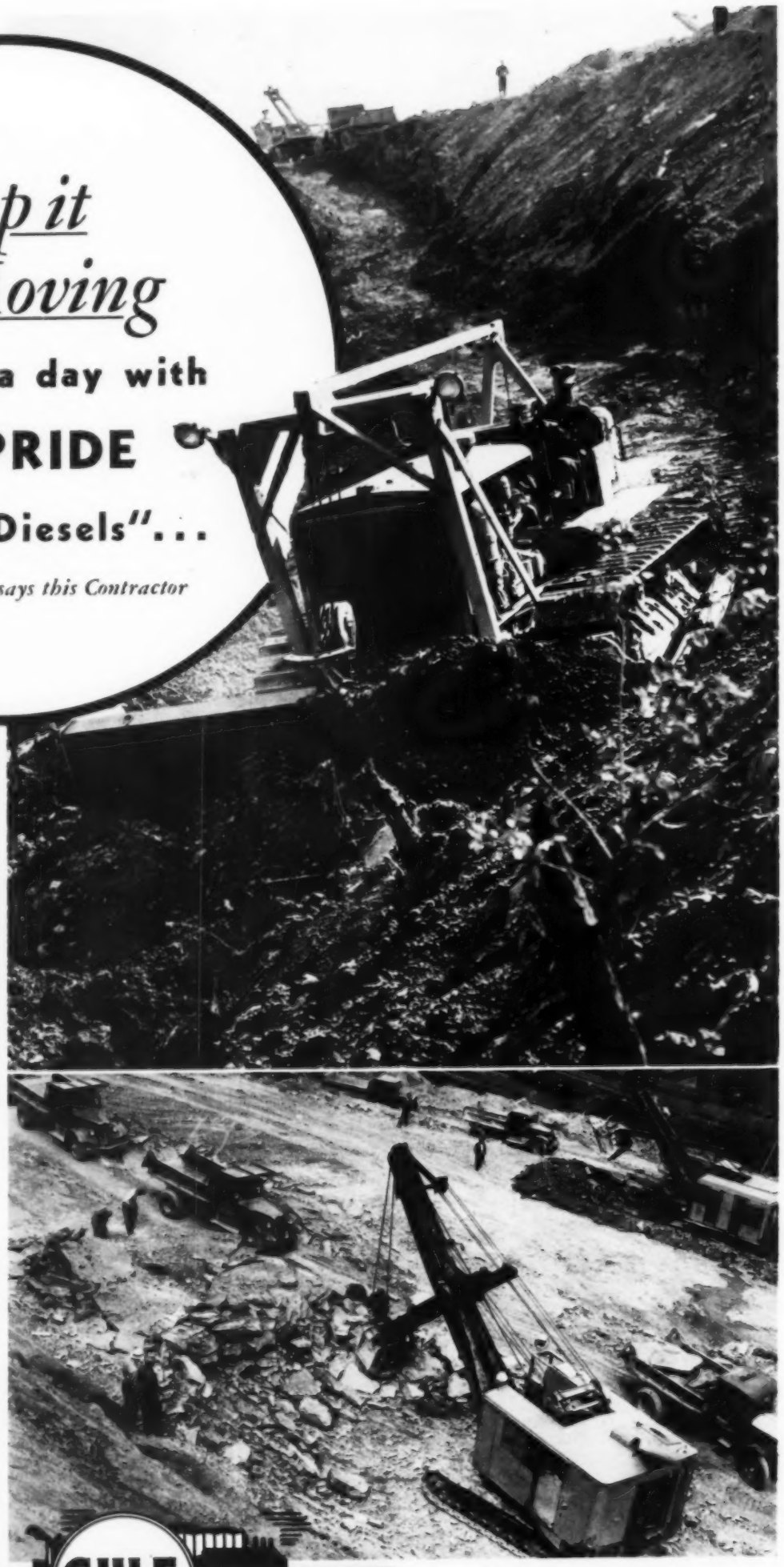
HARNISCHFEGER
CORPORATION

EXCAVATORS • ELECTRIC CRANES • ARC WELDERS P&H HOISTS • WELDING ELECTRODES • MOTORS

"We keep it Moving

24 Hours a day with GULFPRIDE in all our Diesels"...

... says this Contractor



"Gulf's HIGHER QUALITY LUBRICANTS *and fuel help us avoid mechanical troubles and delays"*

"WHEN we started this job, we knew we were up against a tough working schedule and our dieselized equipment would be called upon to move dirt and stone continuously—without time out for repairs," says this contractor. "So we chose the highest quality lubricant we could find—Gulfpride Oil. It's the best 'operating' insurance we know of."

Is Gulfpride Oil expensive, you ask? By the gallon it costs a little more than most oils. But remember this: Gulfpride is made by Gulf's exclusive Alchlor process, a modern method of refining which only Gulf can use. This special treatment gives Gulfpride stability and lasting qualities which far exceed any motor oil of which we have record.

Ask a Gulf engineer to recommend the oils and greases which will insure continuous, trouble-free service for your equipment. No matter where your job is located, Gulf lubricants and fuels are readily available to you through more than 1100 warehouses in 28 states from Maine to Texas.

GULF OIL CORPORATION
GULF REFINING COMPANY
GENERAL OFFICES: GULF BUILDING, PITTSBURGH, PA.

GULF INDUSTRIAL LUBRICATION

ALSO A COMPLETE LINE OF FUEL AND FURNACE OILS

FULL LOADS in 1/3rd the Distance

Watch a Bucyrus-Erie Scraper at work. Notice how fast it fills to a heaping load . . . how quickly the operator shifts his tractor into higher speed and starts off on his way to the dump. Check it with competing units: You'll find that Bucyrus-Eries generally get their loads faster and more easily than other scrapers — often in only one-third the distance.

That's because the Bucyrus-Erie loads directly from the cutting edge, a "double curve" cutting edge that loads the dirt with an easy BOILING action into the APRON of the scraper, as well as into the bowl.

You'll want more details on all the features of this fast digging scraper; write or phone your nearest International Harvester TracTracTor Dealer, and he will be glad to give full information about them to you.

BUCYRUS ERIE

Bucyrus-Erie

SOUTH MILWAUKEE, WISCONSIN

- 1908

MAINTAINERS

SNOW PLOWS

31

Years of

LEADERSHIP

Back in August, 1908, when hitching posts and watering troughs were as common as gasoline pumps are today, Baker introduced the first light road grader and the first successful self-loading scraper, the Maney, which marked the beginning of a new era in earth moving operations and gave impetus to the "good roads" movement just starting.

Soon Baker light steel snow plows appeared on the streets of the nation's leading cities — a fleet of them clearing the Capitol grounds at Washington. Next came the adaptation of Maney Scrapers for tractor use — the first practical tractor scrapers which in the years to come won world-wide favor. One important advance followed another — tripping blades for snow plows, bulldozers built for tractors, the development of hydraulic equipment.

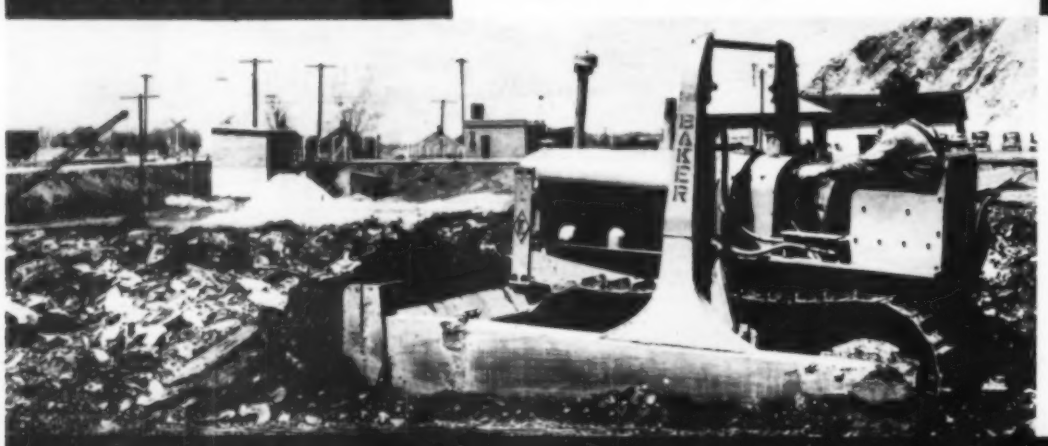
This same pioneering spirit keeps Baker Equipment ahead today. Advanced engineering and modern production methods assure you better built, easier operated, more profitable equipment than ever before. For better performance, be sure to get a Baker.

SCRAPERS

ROAD DISCS

BULLDOZERS

ROOTERS



1939 -

Write for Bulletins on the new Baker Hydraulic Scrapers in 3, 5, 8 and 10 cu. yd. capacities (all with the flat digging angle) — Hydraulic Bulldozers and Gradebuilders — also special Bulletins on other Baker Products.

THE BAKER MFG. CO.
568 STANFORD AVE.
SPRINGFIELD, ILLINOIS

• BAKER TRACTOR EQUIPMENT •

BULLDOZERS • GRADEBUILDERS • SCRAPERS • ROOTERS • ROAD DISCS • MAINTAINERS • SNOW PLOWS

every working hour

a more Profitable hour

Cummins Diesel economy means twice the miles or horsepower hours per gallon, when compared with gasoline engines of similar size . . . and an extra bonus in the lower priced fuel.

With Cummins Diesel power in your dump trucks, you plan faster schedules with accuracy and assurance. The stability of the Cummins Diesel . . . its established record on day and night duty . . . assures fewer "in-the-shop" hours . . . more profit-producing hours of work.

In shovels and draglines, the recognized dependability of the Cummins Diesel guards your profits against loss through failure or costly service and maintenance interruptions . . . These are some of the reasons why you find nationally-known contractors, Wunderlich, for example, ordering Cummins Diesel power for both trucks and shovels. Cummins Engine Company 1716 Wilson Street, Columbus, Indiana.

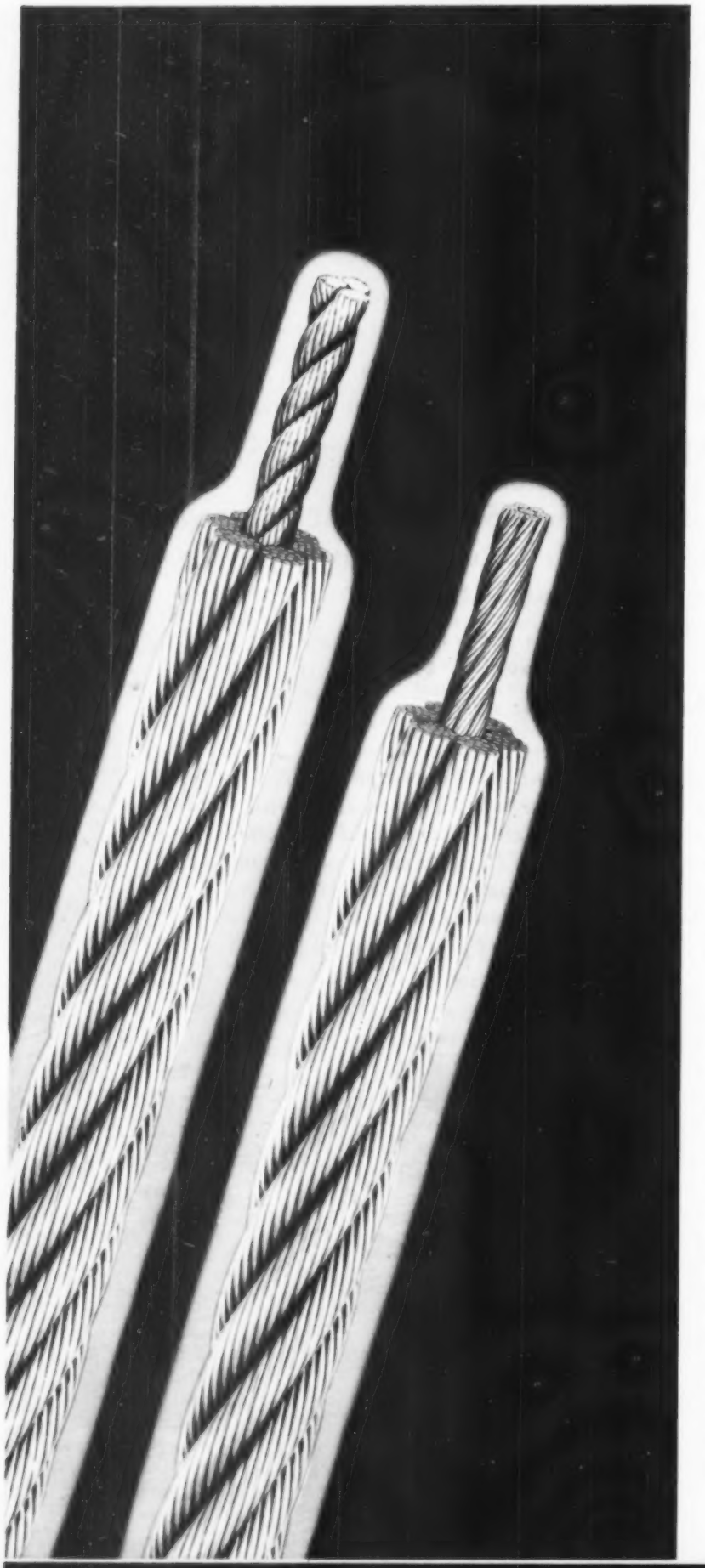
THE SECRET IS **Uniformity**

ONLY in the Cummins Diesel is fuel metered and delivered by ONE LOW-PRESSURE pump

Lang Transportation Corporation's Cummins Diesel-powered Northwest Shovel working on Maricopa Road near Los Angeles, California. The Cummins Diesel replaced a gasoline engine which used 40 gallons of gasoline a day. The Cummins Diesel uses 16 gallons of low-cost fuel oil per day. Such fuel economy is a characteristic of Cummins Dependable Diesels. Lang was one of the first to use Cummins Diesel-powered trucks — they own and operate 32 Cummins Diesel-powered Macks.

CUMMINS
Dependable
DIESELS

PURPLE-STRAND *FORM-SET* WIRE ROPE



A choice of 2 centers

THE real importance of centers in wire rope is not universally recognized. Steel wires, made into strands, support loads and supply the strength. But these strands must be held apart so that they won't "lock," wear and grind as they wind on drums or run over sheaves. The center or core handles this highly important job and the life of a wire rope depends on its performance as much as on that of the steel. Bethlehem offers two types of centers: the standard hemp core and the independent wire-rope center.

Hemp. For years this hard, tough core of hemp or other fiber has been standard in many types of ropes. The core of Bethlehem wire rope is specially lubricated with a compound that keeps the fiber pliable and resistant to moisture. This type of core is widely used in lines where highest strength and resistance to crushing is not required.

IWRC. For heavy loads, nothing can take the place of an independent wire-rope center. It adds 10 per cent to the strength of the rope. It greatly increases resistance to crushing and distortion, both on the drum and over sheaves. While the rope is stiffer to handle, it is just as flexible under load and because of its resistance to crushing it receives less damage in running over small sheaves than fiber-center rope. Bethlehem uses a specially designed wire rope as the center, an independent rope made just as carefully and with just as great precision as the wire rope itself. It carries its own specially compounded lubricant. In Form-Set line the center is also pre-formed. Strands are accurately fitted around the center to give full, adequate bearing surface. The cost is 15 per cent more.

All Purple-Strand Form-Set wire rope is precision designed. Only the finest, premium-priced steels are used. Every step in the making of Purple-Strand is a result of half a century's study of wire-rope problems, three-quarters of a century's experience in making fine steel.

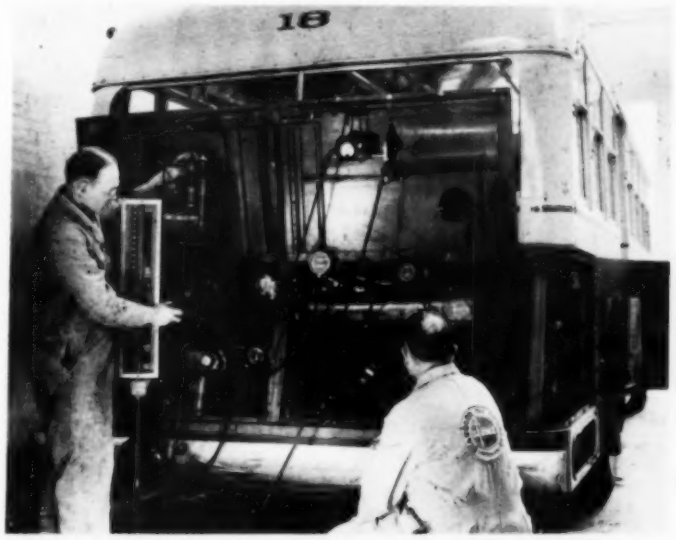
BETHLEHEM STEEL COMPANY

GAS FUMES ELIMINATED FOR CITY COACH CO.

Complaints of gas fumes in the buses of a certain Midwestern city coach company brought a sharp ultimatum from the city health authorities. "Clean up the air in the buses or take them off the street!"

It was no time for this operator to experiment. He called in a Standard Automotive Engineer. From past experience with smoke and odor difficulties, and with his equipment for accurately checking engine performance, the engineer readily located the cause of the trouble.

Today, this coach company has the best record in its state for clean air and smokeless operation.



Smoke and odor troubles are caused primarily by poor engine performance, low manifold temperatures, poor carburetion, etc. This illustration shows some of the equipment a Standard Automotive Engineer uses to locate the real cause of smoke trouble.

STOPS BEARING FAILURES IN COUNTY HIGHWAY EQUIPMENT

Equipment in a county highway fleet was spending almost as much time in the shop as it was on the job. Bearing failures in the gear cases on trucks and tractors were keeping the maintenance gang busy. Then a Standard Automotive Engineer was given a chance to examine the bearings and the used lubricant.

He found the bearings corroded and etched. The lubricant had oxidized and formed a coating on the gear cases. Naturally the bearings were not getting proper lubrication.

The Engineer recommended the right grade of a more stable lubricant for each type of equipment. Bearing failures from this source have been entirely eliminated.

K. E. Mebold, Automotive Engineer, Kansas City, explaining the purpose of various instruments he uses to W. S. Burks, Fleet Manager of the Gillette Transportation Company.

TRUCKER HAULS 15-TON LOADS AND STILL GETS 6 TO 7 MILES PER GAL.

Engines picked up as much as 2 miles per gallon after a Standard Automotive Engineer finished checking a Kansas Transport fleet. On one of the large tractor-trailer units this meant a saving of 3 barrels of gasoline a week under normal operation. And that saving wasn't made by sacrificing power. This unit still handles loads up to 15 tons with ease.

That's where Standard Automotive Engineering Service differs. These Engineers have scientific instruments to locate the real cause of engine inefficiencies. Their instruments are portable. They can be used in your trucks *on the road* where the engine can be checked for both power and gasoline consumption under actual operating conditions.

Let one of these Engineers show you just what he does on one of your own trucks. You can reach him through your local Standard Oil (Indiana) office or by writing 910 South Michigan Avenue, Chicago, Illinois. It will cost you nothing but the phone call or post card.

Riding the trucks even on night runs is all a part of the Standard Automotive Engineer's job. Illustrated here are a few of the instruments that tell him what's going on inside the engine under actual operating conditions.

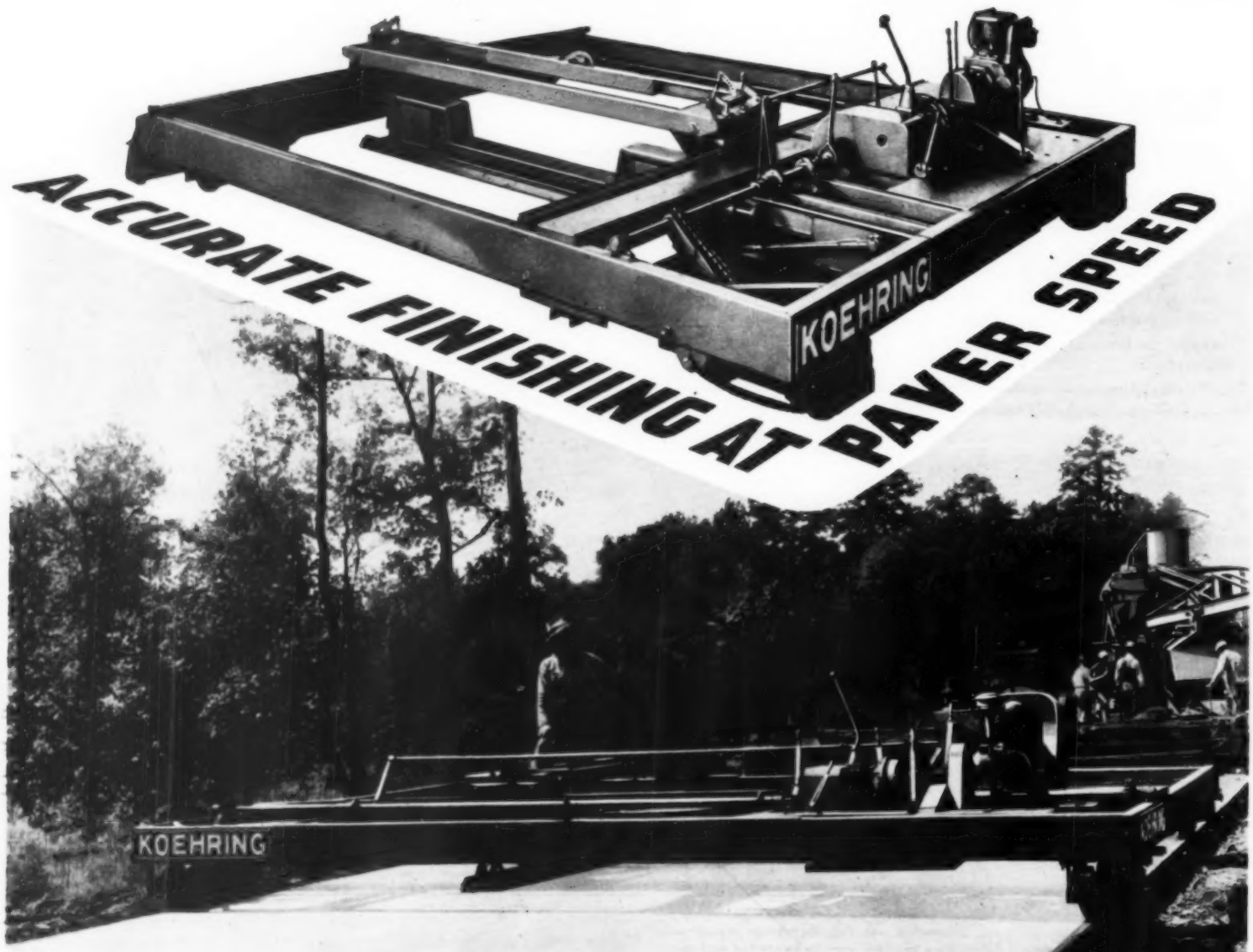
FIRST IN SERVICE FOR FIFTY YEARS — STANDARD OIL (IND.)

STANDARD OIL COMPANY (INDIANA)

AUTOMOTIVE ENGINEERING SERVICE

LOWERS MILEAGE COSTS

KOEHRING



● High speed and the greatly increased production capacity of modern single and two compartment drum pavers demand an increased speed in the slab finishing operation — *without* sacrifice of specification accuracy. The Koehring Longitudinal Finisher has the *speed* and *accuracy* required for any speed and production of any paver. Whether operating at high or low speeds, the same accuracy and uniformity is assured for the entire job. A Longitudinal Finisher on the slab does a better finishing job, can be adjusted for any speed to suit the paver production, and is as accurate at the end of the day, end of the job, as at the beginning.

KOEHRING COMPANY · *Milwaukee, Wis.*

Koehring Longitudinal Finisher on a highway paving job with high speed Koehring 34-E Twinbatch Paver, keeping pace with the high speed paver production.

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

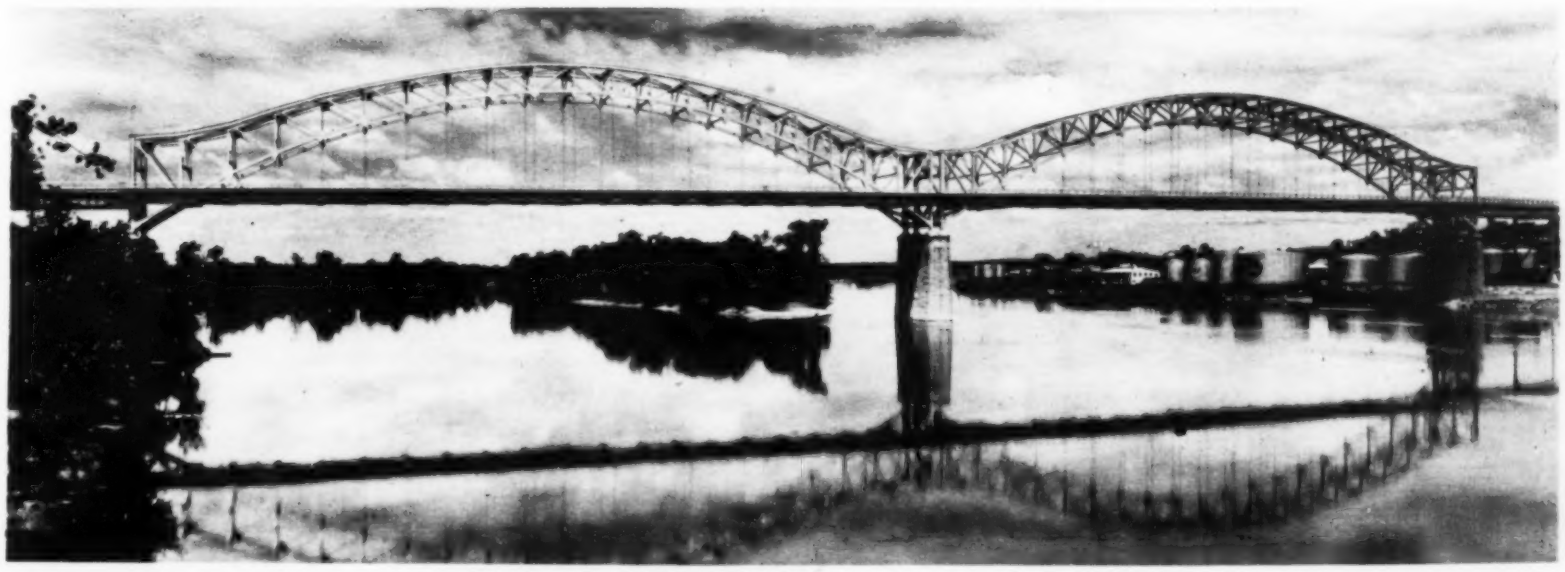
Established in 1919
A McGRAW-HILL PUBLICATION

Construction Methods and Equipment

ROBERT K. TOMLIN, Editor

Volume 21 | August, 1939 | Number 8

FOUR STEEL BRIDGES *Take Beauty Awards*



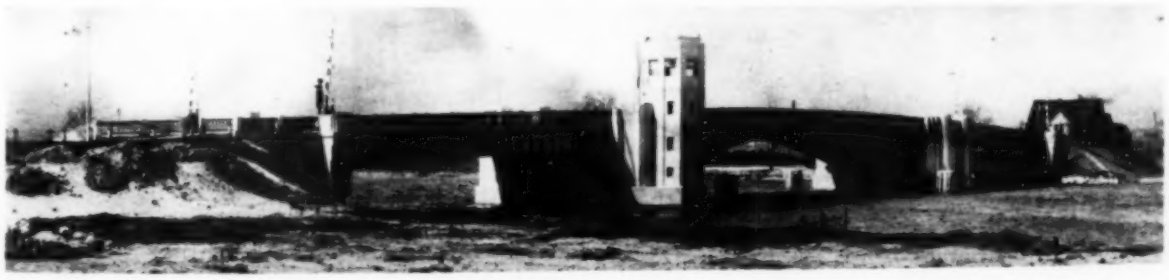
MIDDLETOWN-PORTLAND BRIDGE across Connecticut River at Middletown, Conn., takes first prize among 1938 bridges costing more than $1,000,000. Total cost, $3,000,000. Two tied steel arches of 600 ft. each; total length, 3,400 ft. Designed by William G. Grove under direction of L. G. Sumner, engineer of bridges and structures, Connecticut State Highway Department. Superstructure erected by Bethlehem Steel Co.

FOUR STEEL BRIDGES completed in 1938 have received awards from the American Institute of Steel Construction as the most beautiful structures, in their respective classifications, opened last year. A jury of architects, engineers and artists selected the bridges, each of which is henceforth privileged to bear a plaque inscribed "most beautiful steel bridge, in its class, completed in 1938."

In Class A, bridges costing $1,000,000 or more, first place went to the Middletown-Portland bridge, illustrated and described above. Honorable mention in this class was given the Blue Water bridge across the St. Clair River between Port Huron,

(Continued on page 78)

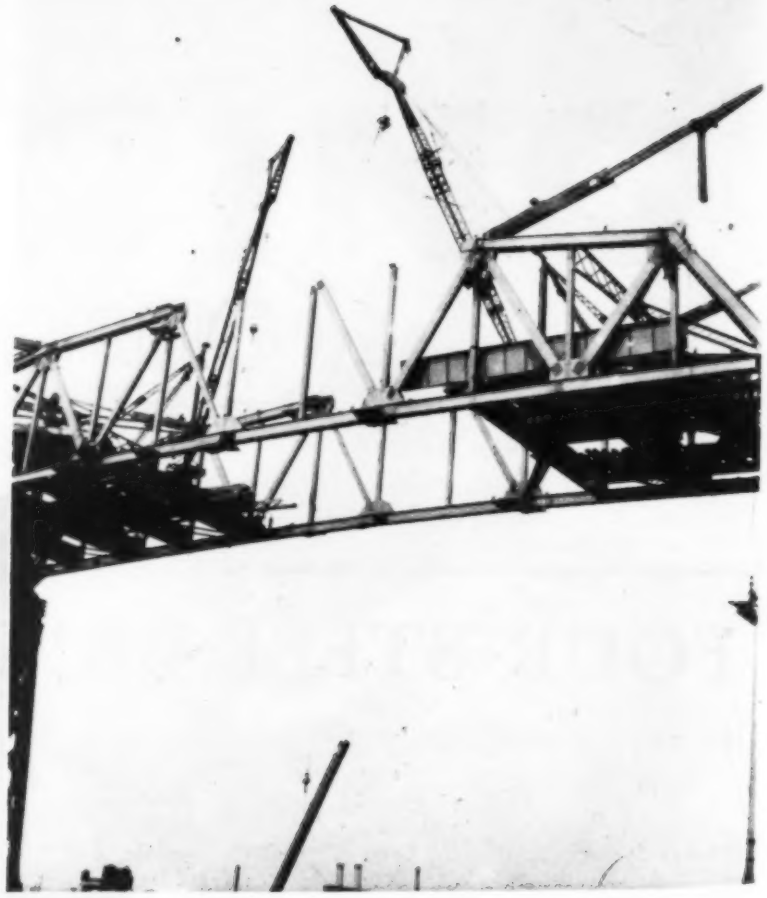
CAPITAL BRIDGE over Kentucky River, at Capital Ave., Frankfort, Ky., takes first rank in Class B, $250,000 to $1,000,000. Total cost $329,316. Continuous three-span unit of 137-200-137 ft.; three 67-ft. spans. Designed by bridge department, Kentucky Department of Highways; steel fabricated by Bethlehem Steel Co.



LAFAYETTE AVE. BRIDGE (left) across East Channel, Saginaw River, Bay City, Mich., is adjudged most beautiful movable bridge completed in 1938. Owner, City of Bay City; total cost, $380,000. Bascule span, 185 ft.; approach spans 108 ft. and 96 ft. 10 in. Engineers, Hazelet & Erdal; steel fabricator, the R. C. Mahon Co.

This Month's

"NEWS REEL"



CLOSURE OF CANTILEVER MAIN SPAN (above and left) of Meeker Ave. bridge over Newtown Creek, Brooklyn, N. Y., is made July 5 by American Bridge Co. for New York City's Department of Public Works, as derrick travelers with 90-ft. booms and 20-ft. jib attachments place final steel members in through-trusses 300 ft. long, spaced 75 ft. 10 in. apart on centers. Started March 13, erection of main span, involving 17,000 tons of steel, was completed in less than 4 months. During cantilever erection steelwork was supported by eye-bar toggles from erection bents at each end.

NEW JERSEY APPROACH TO LINCOLN TUNNEL, (below) vehicular route under Hudson River between New York City and Weehawken, N. J., is completed and opened to traffic June 30 by Port of New York Authority. Intersecting streets are carried over or under tunnel approach highway, with no crossings at grade. Express highway ascends westerly slope of Palisades on viaduct, then becomes a depressed highway and proceeds over elevated loop structure to tunnel plaza.

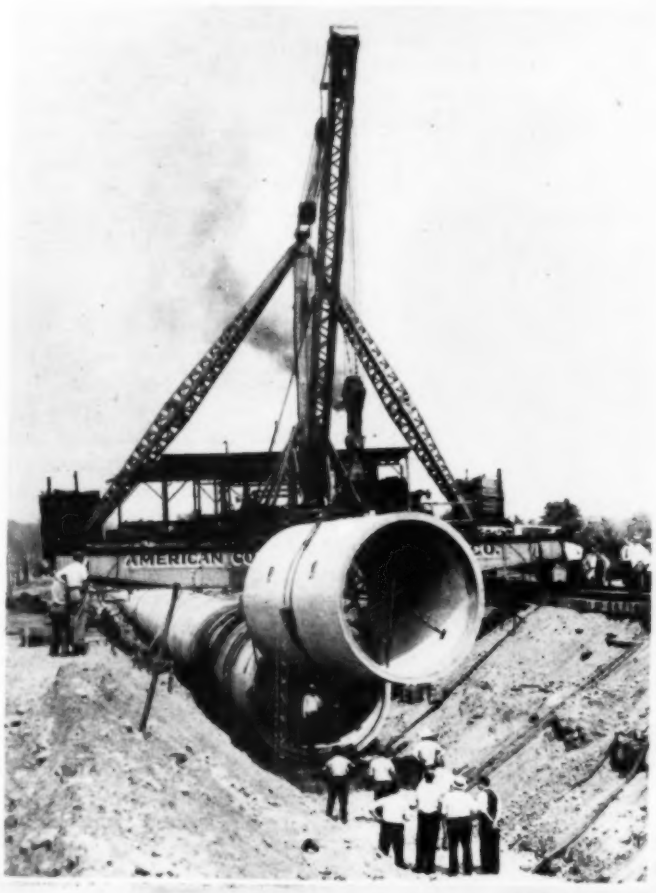
Harris & Ewing Photo

ROAD SHOW GOES TO CHICAGO in 1940, according to official announcement by WILLIAM M. PARRISH, **(left)** president of Highway Industries Association and industrial sales executive of International Harvester Co. Big equipment exhibit will be staged in Chicago's International Ampitheatre during convention of American Road Builders' Association Jan. 29-Feb. 4, 1940.

Fairchild Aerial Surveys

GRADING FOR PENNSYLVANIA TURNPIKE. (right). 161-mi. superhighway toll route between Pittsburgh and Harrisburg, to cost $60,000,000, involves earth moving at average rate of 300,000 cu.yd. per mile, with maximum fill of 90 ft. Here are a few of the 33 Cletrac tractors on the project, operating 12-yd. Heil scrapers for Connell & Laub on the contract of McKinley & Jacobson, between Laurel Hill and Somerset, Pa.

PRECAST CONCRETE PIPE (below), ranging in diameter from 7 ft. to 12 ft. 6 in. and in length from 12 to 16 ft., is placed by stiff-leg derrick traveler for new pressure aqueduct to serve Boston, Mass. Pipe sections weighing as much as 45 tons each are cast at central yard by Lock Joint Pipe Co., of Ampere, N. J., general contractor, with American Concrete and Steel Pipe Co., of Los Angeles, Calif., subcontractor on fabrication and welding of steel reinforcing assemblies. Pipe forming completed aqueduct will operate under hydraulic heads of from 100 to 200 ft. Project is being built under direction of Metropolitan District Water Supply Commission, of Boston, Mass., for which Karl R. Kennison is chief engineer.



SARDIS DAM, with main earth embankment 96 ft. high and 8,700 ft. long placed as hydraulic fill, in addition to rolled earth fill lateral dikes 4,300 ft. long, assumes shape across Little Tallahatchie River in northern Mississippi, under direction of Lieut.-Col. Raymond G. Moses, U. S. District Engineer at Vicksburg, Miss. Dam is being built as part of $15,000,000 flood control project in Yazoo River basin. Estimated quantities include: 13,815,000 cu.yd. of hydraulic fill; 2,945,000 cu.yd. of rolled earth fill; 82,000 cu.yd. of concrete; and 460,000 tons of riprap.

DEER ISLE-SEDGEWICK BRIDE (left), connecting Deer Isle with mainland of Maine, was dedicated June 19. Suspension structure designed by Robinson & Steinman, consulting engineers of New York City, has main span of 1,080 ft., supported by 185-ft. steel towers, and side spans of 484 ft. Cost was $870,000. Contractors were Merritt-Chapman & Scott Corp., for substructure; and Phoenix Bridge Co., for superstructure.

SCHEDULING OF MATERIALS

Governs Construction Economy on Low-Cost Buildings

Prefabrication and Pre-Assembly of Multiple Duplicate Farmstead Units

• MOST OF THE CONTRACTORS building rural units for the Farm Security Administration maintain that they attempt little prefabrication and pre-assembly because these processes are uneconomical. A number of the contractors admit that they reject the possibility of more extensive prefabrication and pre-assembly because they lack, and fear they cannot afford, the semi-technical man-power required for scheduling such operations.

Engineers of the Farm Security Administration are not sufficiently equipped with contractors' cost data to determine definitely whether the argument against more prefabrication and pre-assembly is valid. Common experience on other types of construction, such as building forms on concrete bridge work, shows that precutting and prefabrication are much cheaper where these methods are applicable. In many cases the entire scheduling and timing involved in the operations are handled by a foreman-carpenter or by the construction superintendent. In view of these facts and of the Farm Security Administration's favorable experience with pre-assembly on force-account projects, the engineers incline to the belief that contractors do not go so far as they might in prefabrication, particularly in cases where the contractors are also in the millwork business.

OLD AND NEW farmstead units at Allendale Farms, S. C., give visible evidence of improvement in living conditions and outbuildings on project of Farm Security Administration. Drafty and dilapidated habitation will be removed as soon as family moves into new house.

BRICK MASONS experienced in this kind of work lay up foundation piers for house.

CLOSE SCHEDULING of materials and material deliveries gives the key to economical construction of low-cost farmstead units, according to W. J. Bleakley, contractor, Orangeburg, S. C., who has just completed 33 units, comprising five-room house, barn, outbuildings, well and fences, for the Farm Security Administration at Allendale Farms, S. C. All materials were trucked 55 mi. to the project from the Orangeburg yard and mill of the Fairfax Manufacturing Co., headed by Mr. Bleakley, which manufactures lumber and distributes building supplies. About 60 per cent of the lumber was pre-cut to exact dimensions at the plant, but no prefabrication was attempted, as the contractor did not consider precision work of this kind economical in view of efficient construction labor available at moderate contract wage rates in the field.

At the low prices bid for standard rural units of the Farm Security Administration, Mr. Bleakley feels that a secondary profit on materials is necessary to protect the contractor against loss in high-speed construction of scattered low-cost units. A period of 90 calendar days was allowed by the contract for completion of the 33 units, with labor limited to 8 hr. per day and 40 hr. per week. Total contract cost of a complete unit was $2,600, including $1,401.25 for the five-room house, as indicated by an accompanying tabulation.

In the same table are given contract prices for 26 farmstead units under construction simultaneously at Allendale Farms by the Empire Construction Co., Mountain Creek, Ala., operating without protection of a secondary profit on materials. Wage rates were uniform on the two contracts. Despite the greater risk involved in operating as an independent builder, purchasing materials from outside sources, bid prices of the Empire Construction Co. were lower on certain items.

Six of the 26 farmstead units in the Empire contract duplicate the units built by W. J. Bleakley, and a

Contractor's Labor Force
ON 33 FARMSTEAD UNITS
Allendale Farms, S. C.

Contract time, 90 calendar days

		Hourly Wage
2	brick masons	.85
1	brick mason's helper	.25
21	carpenters	.75
19	laborers	.25
6	painters	.75
1	truck driver	.40
1	well driller	.75
1	well driller's helper	.40
1	construction superintendent	—
53	men, total	

comparison of prices on these units is possible. The Empire Construction Co. built the houses for $1,480 each, almost $80 higher than Mr. Bleakley, but the total contract cost for a complete unit was $2,526, almost $75 lower, by virtue of reduced prices on other items.

Low-Cost Houses — Of widest interest are the low-cost wood-frame houses designed by the Farm Security Administration to meet cost limitations (for force-account construction) of $1,300 for five-room dwellings in the south and $2,100 in the North. Prior to establishing the policy in 1938 of doing all work by contract, the Farm Security Administration built houses by force account within these limits, devising pre-cutting and prefabrication methods to reduce costs, as illustrated by the southeast Missouri project described in Construction Methods and Equipment, June, 1939, pp. 48-49. Methods developed on earlier projects are being applied with some modification on contract construction today. For contract work, cost limitations are increased to provide latitude for the contractor's taxes, insurance and profit.

Materials Schedules — Two motor trucks, a 3-ton carrier and a 10-ton tractor-trailer combination, hauled all materials for the 33 farmstead units 55 mi. from Orangeburg to the project. The units were distributed in three groups, with a maximum distance of about 4 mi. between them. A third truck, of 3-ton capacity, hauled materials between units at Allendale Farms.

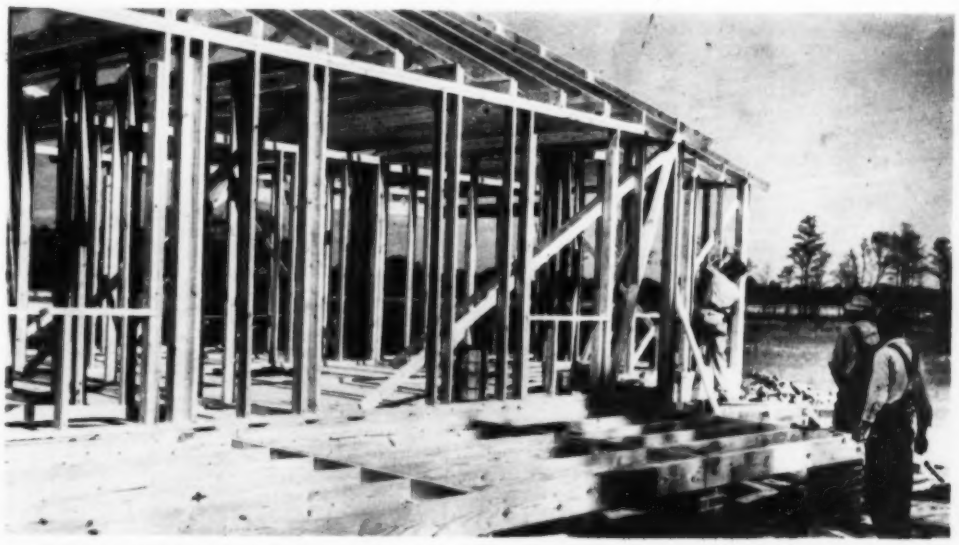
To control materials deliveries to the job, the contractor prepared materials schedules giving complete breakdowns by truckloads of lumber for the various buildings of a farmstead unit. Each schedule gave an itemized list of pieces required and specified the dimensions, grades and quantities for individual items.

Framing for one house, as noted on the framing schedule, required two loads by the large truck. Doubling the quantity of outside finish lumber made one large load, and doubling the quantity of inside finish made another load for the large unit.

ALLENDALE FARMS, S. C.
Farm Security Administration
UNIT PRICES ON TWO CONTRACTS

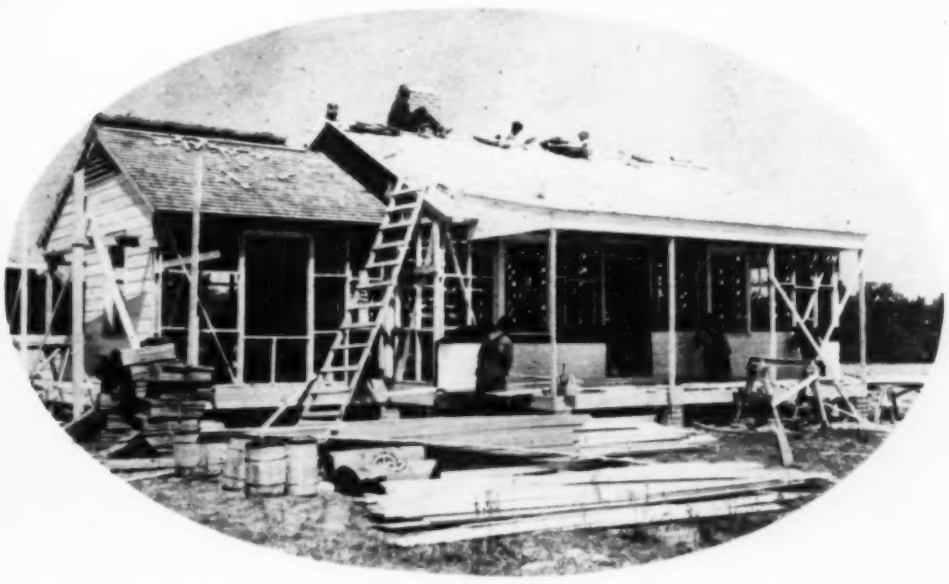
Contractor		W. J. Bleakley			Empire Construction Co.	
Description	*Quantity*	*Unit Price*	*Total*	*Quantity*	*Unit Price*	*Total*
House — Plan 315-87	33	$1,401.25	$46,241.25	6	$1,480.00	$8,880.00
House — Plan H-3				9	1,270.00	11,430.00
House — Plan G-3				8	1,280.00	10,240.00
House (Repair)				6	225.00	1,350.00
Barn — Plan D-A3	33	512.50	16,912.50	23	430.00	9,890.00
Barn (Repair)				6	100.00	600.00
Smoke House A	33	87.25	2,879.25	29	70.00	2,030.00
Poultry House A	33	87.25	2,879.25	29	80.00	2,320.00
Privy	33	70.75	2,334.75	29	55.00	1,595.00
Garden Fence	33	97.50	3,217.50	29	58.00	1,682.00
Stock Lot Fence	33	61.50	2,029.50	29	48.00	1,392.00
Well Complete, 100 ft. deep	33	282.00	9,306.00	29	305.00	8,845.00
Additions per foot, excess 100 ft.		1.75			2.25	
Deductions per foot, less 100 ft.		0.75			1.75	
Storage Houses (Repair)				4	25.00	100.00

LOWER PRICES THAN THOSE NOTED ABOVE were received later for construction of 28 additional units at Allendale Farms. Submitting prices on alternate plans for five-room houses to be erected on 24 of these more recent units, W. J. Bleakley, low bidder, asked $1,226 for Plan 315-87, $1,169 for Plan G-3 and $1,103 for Plan H-3. Contract as awarded called for houses of lowest price, with separate contract for construction of wells going to another bidder. Based on contract prices, total cost of complete unit, including house, barn, outbuildings, fences and well, amounted to $1,943.50.



USING LUMBER delivered by truck from yard 55 mi. away, carpenters erect frame for one of 33 standard houses included in Bleakley contract.

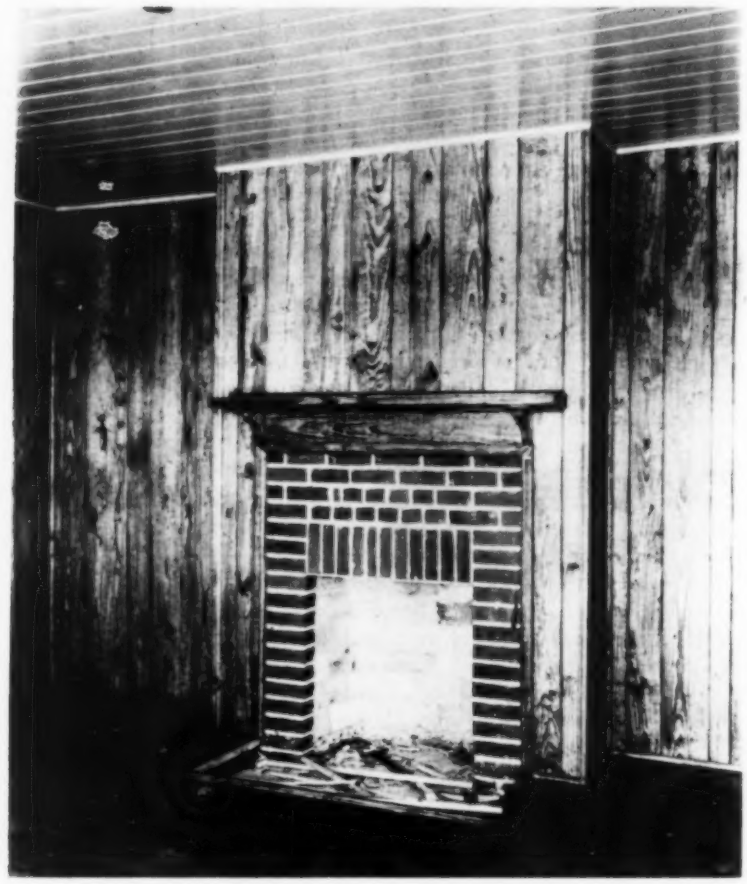
WITH FRAMING, roof and outside finish completed, house is ready for inside finish crew.



MORE MEN THAN USUAL are at work on this house, where outside finish crew has started to apply siding before roofers have finished their job and moved on to next unit. Porch roof is 28-gage copper-bearing galvanized sheet metal.

HOUSE, BARN AND OUTBUILDINGS (right) are constructed by progressive stages as specialist crews move from one to another of 33 farmstead units.

INTERIOR FINISH utilizes 1x6-in. T.&G. ceiling boards and ¾-in. V-joint T.&G. full-length vertical boards in 6-in., 8-in., and 10-in. random widths for the walls.



KNOTTY PINE WALLS of living room are stained, varnished and waxed to smooth, velvet finish. Fireplace has 30-in. opening 18 in. deep lined with 2-in. fire brick.

CONSTRUCTION of farmstead units is directed by (left to right) LEM M. STUBBLEFIELD, contract engineer, Farm Security Administration; GEORGE J. DUNN, inspector; W. J. BLEAKLEY, contractor; and J. WALTER INABINET, construction foreman.

For the barn, one load by large truck and one load by small truck were required. Materials for the smoke house and poultry house together made one load for the small truck. The 10-ton tractor-trailer never was loaded to capacity.

Construction Program — A small construction force working under the direction of a competent field superintendent built the units by progressive steps, specialist crews moving from unit to unit to perform their own shares of the work in successive stages. Construction of each unit started with brick masons who built stepped foundation piers. Brick piers were used in preference to precast concrete piers because the negro brick masons were skilled in building brickwork to line and grade but would have had to learn the trick of setting precast piers to the same accuracy.

Following the brick masons, a rough-framing crew erected the skeletons of the house and barn. As soon as the framing was completed, the bricklayers returned to complete the fireplace and chimney. For the next step, a small crew put on the roof. At about the same time, or shortly thereafter, another crew put the outside finish on the house and barn, applying the siding, setting window and door frames, and hanging the windows and louvres. Louvres, doors and frames for exterior doors were made up at the mill for delivery to the job. Window frames and glazed sash were purchased in prefabricated units at a saving over cost of manufacturing them in Orangeburg.

Specifications required that window frames and sash, door frames and doors, louvre frames and porch columns be primed at the mill. Exterior siding and trim, according to the specifications, had to be primed immediately after being placed, but Mr. Bleakley preferred to prime this lumber at the mill, giving the material additional protection before it was

applied. As soon as the outside finish of the house had been completed, painters applied the second coat to siding and trim. A small crew then completed the interior finish of the house and built feed boxes, mangers and other inside work in the barn. A final operation, by the painters, applied the third coat of paint to the outside of the house and completed painting, staining, varnishing and waxing as specified for the interior.

Treated Lumber — Specifications required that all sills, girders and floor joists be given two brush coats of No. 1 creosote oil, Celcure-Sol or an approved equal preservative treatment. Mr. Bleakley used Celcure-Sol to avoid possibility of skin burns in handling, while the Empire Construction Co. on its contract employed creosote.

Barn Stain — To stain the exterior of the barn and outbuildings, the interior of the barn shed and both sides of all doors, specifications permitted either creosote oil or Celcure-Sol. The contractors used the same materials as in treating floor framing, applying the stain with pressure sprays.

Aluminum Prime — At the option of the contractor, priming on the exterior of the house could be done with aluminum paint. The Empire Construction Co. applied this priming material by brush immediately after the siding had been placed. Use of aluminum prime eliminated need of shellacking knots, as required before applying lead and oil prime.

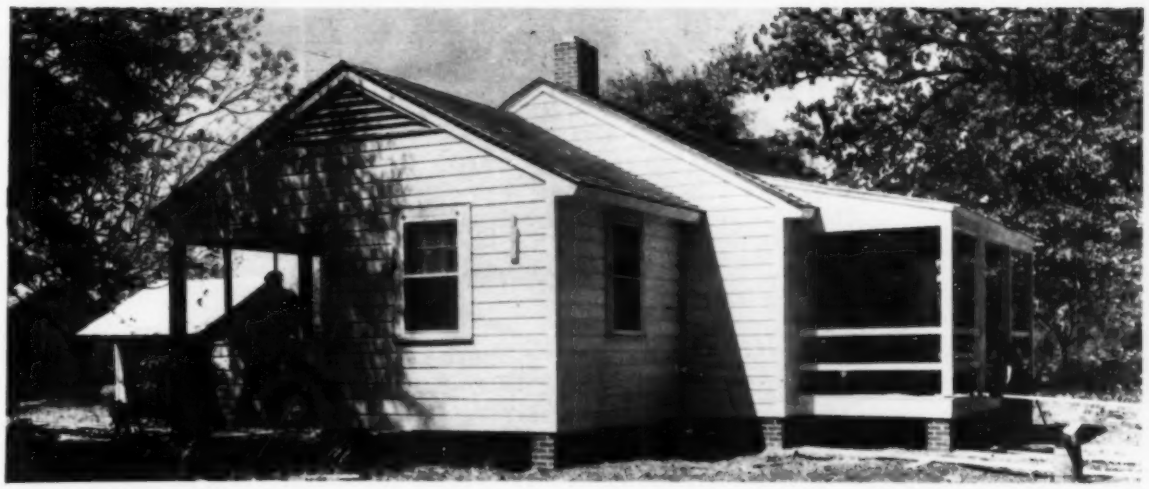
Empire Construction Co. Procedure — In contrast to the progressive construction sequence adopted by Mr. Bleakley, the Empire Construction Co. employed its entire force to frame and inclose the houses during the first part of the job, leaving all interior work to be completed during the second part, unaffected by weather conditions.

House Dimensions — House plan 315-87 erected on the 33 Bleakley units and on six of the Empire units has overall dimensions (exclusive of the front porch) 42 ft. 5 in. by 23 ft. 8 in. The main section of the house, containing four rooms, is 30 ft. by 23 ft. 8 in. A wing, inclosing one room and a screened work porch, measures 12 ft. 5 in. by 18 ft. 10 in. Inclosed floor area is 940 sq.ft. Ceiling height is 8 ft. 4 in. The front porch measures 22 ft. by 7 ft.

Lumber—Except for millwork and shingles, the houses were built entirely of southern yellow pine. Shingles were 18-in. red cedar, from the Pacific Coast, laid 5½ in. to weather. Accompanying photographs illustrate details of construction.

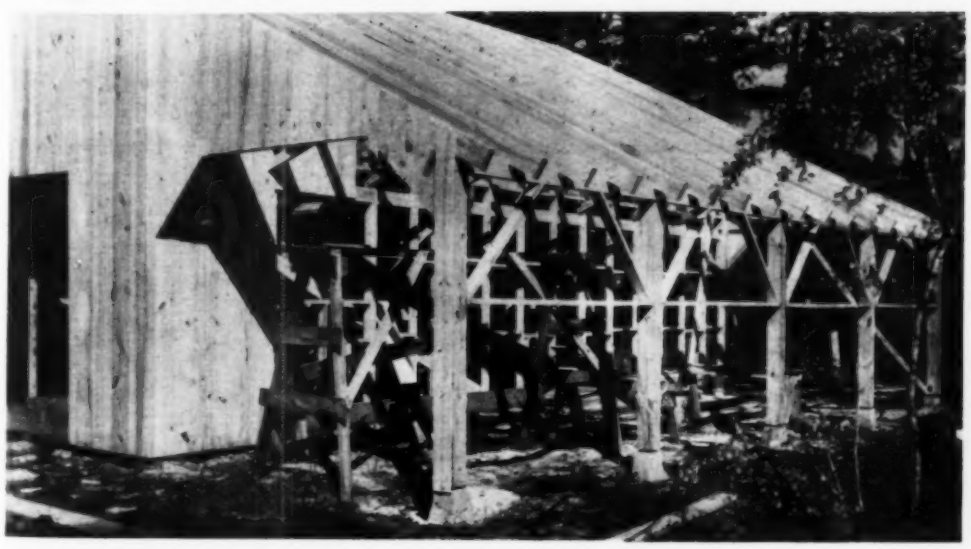
Administration—For the Farm Security Administration, Baird Snyder, Washington, D. C., is chief engineer, and Franklyn H. McGowen, Montgomery, Ala., is district engineer. Construction of the project at Allendale is under the immediate supervision of L. M. Stubblefield, contract engineer, Orangeburg, S. C.

Operations of W. J. Bleakley, contractor, Orangeburg, S. C., were directed in the field by J. Walter Inabinet, construction foreman in charge of all the contractor's work at Allendale Farms.

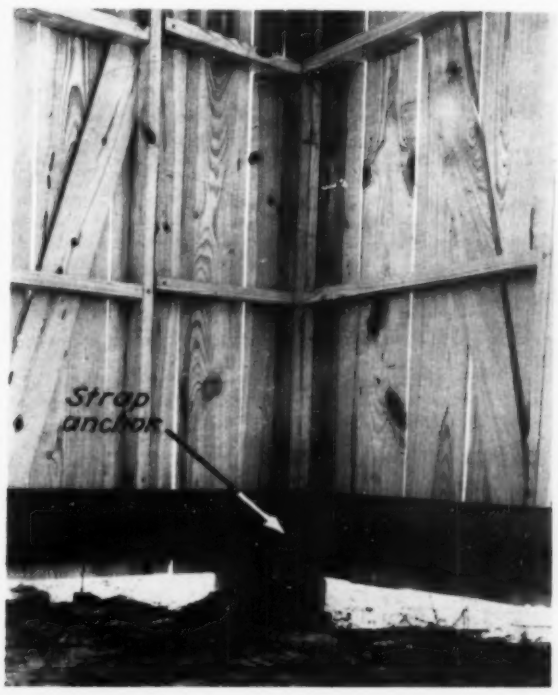


WORK PORCH occupying rear of house wing is fitted with screen cloth secured by molding. Each window has screen for lower half of opening.

VERTICAL SIDING (left) of 1-in. boards incloses barn, which has plan dimensions of 32x29½ ft., including shed 10 ft. wide under roof framing in foreground.



SOLID 6x6-IN. POSTS of barn shed rest on washers on precast concrete piers, to which posts are doweled. Main piers of barn are brick.



BARN SILLS are anchored at each exterior corner pier and at both sides of wide openings by lag screws through strap anchors embedded in piers. House sills are similarly anchored at corner piers.

SAGAMORE BRIDGE is one of two high-level continuous-truss structures with 616-ft. main spans erected in 1934-35 to carry 40-ft. roadways across Cape Cod canal.

ASPHALTIC RESURFACING

Protects Deck Pavement On Cape Cod Bridges

TO STOP WATER INFILTRATION into the deck pavement of the Bourne and Sagamore bridges over the Cape Cod canal, the U. S. Engineer Department last year covered the roadways with an impervious asphaltic resurfacing incorporating a granular top course. Both bridges were paved upon completion in 1935 with two-course, open-mix asphaltic concrete (liquifier type) 2 in. thick on a waterproofing coat of cut-back asphalt placed on 7-in. reinforced-concrete floor slab made with lightweight burned shale aggregate known commercially as Haydite. Bridge roadways 40 ft. wide were divided into 10-ft. lanes by traffic marking strips of white marble concrete.

Although no marked surface disintegration of the

TO MEET GRADE of bridge expansion joint with new surface treatment, portion of existing bituminous concrete surface is removed.

HAND-WHEELED POT and squeegee apply tack coat to avoid spattering that might result from using pressure distributor in windy location.

SHEET ASPHALT BINDER COURSE (left) is laid by machine spreader on top of tack coat.

HOPPER of mechanical spreader **(left)** is charged with asphalt mixture delivered by end-dump trucks from plant 30 mi. distant.

COMPLETED RESURFACING provides ½ in. of impervious sheet asphalt under ½ in. of granular top course.

pavement was apparent during the next 2 years, a small break occurred in the roadway over the center span of the Bourne bridge on May 10, 1937. Upon investigation of the structure by the U. S. Engineer Department, Boston District, which has jurisdiction over the bridges, and independently by Fay, Spofford and Thorndike, consulting engineers, Boston, who had designed them, it was disclosed that infiltration of water was causing deterioration of the concrete floor slab. Tests were made by the Army Engineers to determine the amount of water infiltration, which was found to be considerable.

Later in 1937 a small experimental section of an asphalt resurfacing, designed for imperviousness to water and for non-skid surface as well, was laid on the Bourne

(Continued on page 99)

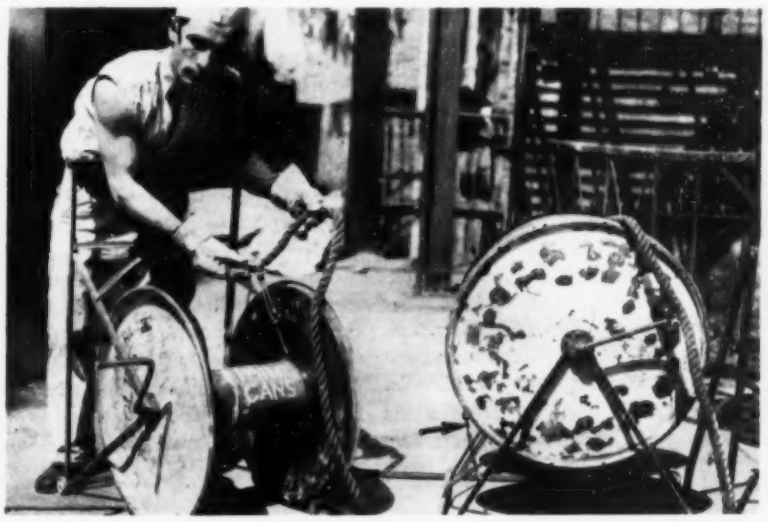
GRANULAR ASPHALTIC MIXTURE spread by machine in background gives non-skid surface texture visible in foreground.

HOME-MADE REELS *Save Scaffold Ropes*

IMPROVISED REELS made of steel barrel lids and gallon-size paint cans eliminate the tedious work of coiling rope by hand on hanging scaffolds and possess other desirable features, according to Andrew Vena, New York City, who supplied the accompanying photographs and data. The reels are designed with frames mounted on roller-skate wheels to make them easy to move about. Threaded crank-handles used to wind rope on the spools can be turned flat when not in use. By keeping rope off the ground during the working day, the reels protect it from water, lime, acid, tar and sharp-edged objects. Because the reels are light in weight, they can be left, with the rope wound on them, on the scaffold overnight or over a week-end.

Each reel is made up of two steel barrel lids and two 1-gal. paint cans fastened together through the center by a ½-in. threaded rod. Flanges are screwed to both ends of the rod, and these flanges in turn are bolted to the steel-lid disks. The crank handle is screwed to one end of the threaded rod. All threaded joints are drilled to take a nail or cotter pin. A frame for each reel is made from a 15-ft. length of ⅜-in. angle iron, and the two small wheels are taken from a roller skate.

HOME-MADE STEEL REEL carrying 375 ft. of rope and set of blocks is easily moved about on roller-skate wheels. Second reel is turned flat to protect rope from falling objects. — Photos from ANDREW VENA, New York City.



END OF ROPE is anchored to spool, preparatory to being wound on reel. Arrow, at right, indicates chain and hook through drilled hole in rim of disk to keep reel from turning while it is being moved.

RESTRAINTS OF TRADE
In the Building Industry

OUTLINE OF DEPARTMENT OF JUSTICE PROGRAM OF ANTI-TRUST ENFORCEMENT ON NATION-WIDE SCALE, TO INSURE FREE FLOW OF GOODS AND COMMERCE

(Extracts from address delivered before New York Building Congress, Inc., June 21, 1939.)

By THURMAN W. ARNOLD

Assistant Attorney General of the United States

● In view of the announced program of anti-trust prosecutions in the building industry by the Department of Justice, the accompanying statement by Mr. Arnold should be of vital interest to engineers and contractors, to manufacturers and distributors of construction equipment and materials and to organized labor. — EDITOR.

THE PROBLEM OF AMERICA today is a problem of producing and distributing the food, the manufactured articles and the housing which its machines and labor are capable of producing. It is obvious that if we could distribute what we are able to produce there would be no idle capital and no idle labor. It is equally obvious that the idle productive plant and idle labor of America, today, represent the most colossal waste of potential energy in the history of the world.

Today our problem of distribution needs concentration on an existing situation and immediate practical action. Such action can only be accomplished within the limits of our traditional principles of government. It can only be effective if it is confined to taking up one industry at a time. It is the great merit of the anti-trust laws that they permit us to take up one industry at a time. The philosophy behind them is so well accepted that it is not even a political issue. It represents our oldest American tradition, the tradition of free and independent industrial enterprise.

"Unreasonable restraints of trade are, in my opinion, the most conspicuous reason for high construction costs."

The very fact that there is no industrial area, small or large, which is not being invaded by organizations which are trying to keep out competition that hurts, has increased the demand for a return of competition. The number of complaints from business men flooding into my office today is proof that we are not yet ready to accept industrial government by organized combinations. In meeting the demands of independent business men we must remember that our central problem is to distribute goods, not to destroy efficiency. The anti-trust laws attack only unreasonable restraints of trade. These are the restraints which give private groups the power to eliminate competition otherwise than by efficient production and distribution.

I am not interested in whether big business is better than little business, any more than whether tall buildings are better than low buildings. The anti-trust laws are not designed to destroy the efficiency of mass production where the savings are passed on to the consumers. They are concerned only in those organizations which, singly or in combination, fix prices or restrict production or eliminate industrial experimentation or new enterprise by arbitrary control over the free flow of goods in commerce.

Anti-Trust Enforcement

I am going to talk of the place of anti-trust enforcement in clearing the obstructions in the building industry. In order to free the distribution of any product from restraints we must do more than attack individual concerns in a helter skelter fashion. We must investigate the process from beginning to end and attack simultaneously every combination which is blocking the distribution of a product from the raw material to the consumer.

In building we have a series of restraints, protective tariffs, and aggressive combinations which has practically stopped progress. No one knows how a house ought to be built or what materials are the most economical or how they should be distributed. Because of the existence of aggressive combinations, experimentation in housing has to proceed by compromise with various gangs. Both standardized equipment and experiments with standardized methods of construction are limited in large-scale housing projects largely because of these compromises.

I believe that we can develop the techniques to build cheaper houses. I believe that we have the enterprise to experiment with those techniques. I believe that the only instrument presently available for freeing the channels of trade so that such experiments can be conducted is the enforcement of the anti-trust laws. This requires taking up the production of housing as a single field of activity.

In the past we have spent much of our energy in following complaints against particular concerns scattered here and there all over the country. Such activity has had little effect because a house is the product of a tangle of goods and services. No one who furnishes any single element which goes into the completed product can greatly raise or lower the cost of the whole product. Neither a single heavy industry, nor the distributors of its products, nor the contractors who install them, nor the labor which works on them, operating alone, can do more by vigorously competing than handicap itself for the advantage of others. Economic results in housing can only be accomplished by prosecuting on a nation-wide scale, and simultaneously, the various combinations which are creating the log jam in the building industry.

The building industries are unique in that they have frankly given up half of their job. They take for granted that it is impossible, as things are today, for them to build houses without public aid and sell them cheaply enough that the lowest paid half of the population can afford to live in them. This has been true for four reasons: financing costs were high; taxes were high; land was high; and costs of construction were high. Recently a broad Federal and State program has undertaken to provide adequate cheap credit and even subsidies. But the easing of this difficulty has afforded an opportunity for costs of construction to go still higher.

During the latter half of 1936 and the beginning of 1937 students of housing believed that the long delayed revival of building was at last at hand. Building contracts rose month by month. But building costs rose at the same time and choked the revival. In a number of our large cities the rise of building costs was more than 25 per cent. In more than half the cities reporting it was more than 10 per cent. The collapse of construction followed and contributed much to the recession in 1937.

"The building trades unions often participate in these policies of restraints and add new restraints of their own."

Unreasonable restraints of trade are, in my opinion, the most conspicuous reason for high construction costs. They appear at every level of the building industry. To give a picture of the problem, I shall list typical practices of the building industries which have been found in re-

cent government proceedings or investigations or are involved in substantial complaints to the Anti-Trust Division.

Producers of Building Materials

Producers of building materials have fixed prices either by private arrangement or as the principal activity of trade associations. Owners of patents on building materials have used them to establish restrictive structures of price control, control of sales methods, and limits upon the quantities sold, in direct contradiction of the broad intent of the patent laws to encourage, through inventions, the development and spread of new productive methods. Some of these patent holders have taken advantage of their control over patented products to require their licensees to give them control of unpatented products also. By the use of basing point systems, and zone price systems, various building materials industries have established by formula a rigid structure of uniform prices throughout the country; and in some of these industries such price formulas have encouraged the wasteful location of industrial plant and the wasteful shipment of products to great distances. The use of joint selling agencies has been another means by which some of these groups have undertaken to maintain their prices. In some groups the various producers have subscribed to the theory that every member of the industry should have a definite share of whatever business there is to be done, and that no concern should try to get more than its share by price competition.

"I am not interested in whether big business is better than little business, any more than whether tall buildings are better than low buildings."

Supplementing these various devices for keeping the prices of building material high have been a series of other devices used to discipline competitors who are unwilling to play ball. In one industry the means is cutting off the supply of raw materials. In another, it is starting a series of harassing lawsuits. In a third, it is the harassment of distributors by selling through the seller's own factory branches at prices lower than those at which the distributor is permitted to resell. In a fourth, it is the maintenance of orthodox channels of distribution by concerted refusal to sell to groups representing new methods of sale or new price policies.

"Our central problem is to distribute goods, not to destroy efficiency."

Overlying this mass of practices, often as a result of the pressure placed upon the weaker and smaller competitors, there is a growing concentration of control in many of these industries. For the most part the increase in the size of the business unit has not been the necessary result of more expensive machinery and bigger plants; it has come about by the merger of competing enterprises which continued, after their union, to produce in very much the same way as before. Its chief significance has been an increase in the power of the particular business unit and greater ease in reaching an understanding with the two or three other large concerns in the industry.

Distribution of Building Materials

Various groups of distributors of building materials engage in two kinds of restrictive practice. First, they try to raise the price of their services by establishing a fixed mark-up between the price they pay the manufacturer and the price at which they resell. For this purpose they collusively determine their mark-up or their selling price, and sometimes agree among themselves to boycott manufacturers who will not cut off supplies from price-cutting distributors. Sometimes they conspire with manufacturers' groups to establish a joint price control binding upon the manufacturers' and the distributors' organizations alike.

The second type of restraint by distributors arises from the effort to see to it that all business passes through their hands and that no new methods of distribution are introduced which may dispense with their services. The great weapon in this field is the boycott. Groups of wholesale distributors may boycott those who sell direct to retailers. Groups of retailers may boycott those who sell direct to mail order houses or direct to the ultimate consumers. Sometimes the members of a distributors' organization will boycott any manufacturer who sells in their territory to non-members. To obtain freedom in methods of distribution, some manufacturers have found it necessary to pay the distributor a commission on sales even when the customer and the manufacturer have dealt direct and the distributor has had no part in the transaction.

Building Contractors

Contractors who erect buildings add their own systems of restraint. Many contracting groups maintain bid depositories in which copies of all bids and estimates are supposed to be filed prior to the award of the contract. In some of these depositories the bids are opened before the contract is let and the information thus obtained is used to coerce low bidders to withdraw or raise their bids. Other contractor groups maintain central estimating bureaus which calculate the cost of the job and supply the various contractors with the bids they are to make. In still other groups a central bureau determines the specifications for materials and labor to be included in the bid, and the contractor is expected to apply standard prices and labor rates to these specifications and thereby to arrive at the same bid as everyone else. Some bidding rings determine in advance which contractor is to get the job and arrange their bids so that everyone else bids higher than he.

In addition to these efforts to control their charges for service, many of these groups set up little closed markets from which they exclude outside contractors or new types of services. They may try to keep all the contracting work for local contractors or for contractors who are members of the association. They may refuse to use materials which have been bought from any source of supply other than themselves. They may insist that prefabricated products not be used in the buildings they work in. They may cooperate with contractors interested in other materials, so that no contracting group will work on a building if a product assembled at the factory is used contrary to the wishes of some other group.

Labor

The building trades unions often participate in these policies of restraint and add new restraints of their own. In recent years they have frequently been used as the strong-arm squads for collusive agreements among contractors, refusing to supply labor where the contractors' ring wishes labor withheld. In other cases the unions themselves have refused to permit the use of new products or new processes because of their fear that the new method might make it possible to erect a house with fewer hours of labor than the old. In one city there are two unions with different wage scales getting along together with the greatest peace and amiability. The one works on public contracts and on contracts where strikes and boycotts would be most effective in the center of the city. The other, with a different wage scale, gets all the traffic will bear from the lesser contracts.

"Some bidding rings determine in advance which contractor is to get the job and arrange their bids so that everyone else bids higher than he."

We need no amendment of the law to deal with organized restraints such as I have discussed. We need only enforcement on a nation-wide scale. There are countless others, some of them equally picturesque and many of them equally absurd.

Legislative Restraints on Trade

Such practices crystallize and lead to legislative restraints on trade. Many building regulations are, in reality, protective tariffs. The licensing and registration of contractors by boards of contractors affords a means of discipline over contractors. In one state, a contractor who must take out a license, is one who undertakes "to construct, alter, repair, add to, subtract from, improve, move, wreck, or demolish any building, highway, road, railroad, excavation, or other structure, project, development, or improvement, or to do any part thereof, including the erection of any scaffolding, or other structure, or works in connection therewith." To this broad class of work which includes practically everything, the statute applies a method of rating bidders according to vague standards interpreted by the contractors themselves. It then puts handicaps on out-of-the-state contractors and out-of-the-state products. This is not an isolated example.

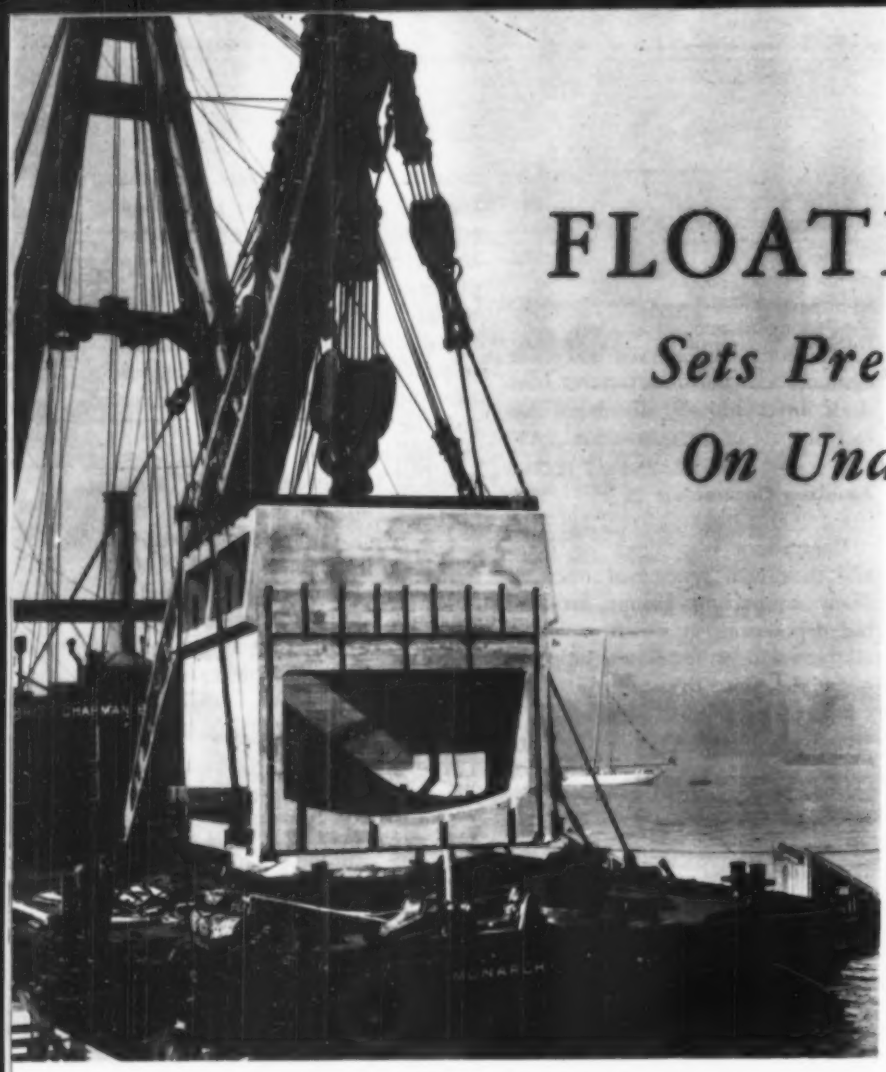
On top of legislative restrictions are added municipal ordinances designed to restrain competition. They start out from the

(Continued on page 96)

"I am convinced that if we deal in a coordinated way with the entire fabric of restraints, from production of materials through to the final work of labor, we can get cheaper houses by freeing the industry."

FLOATING DERRICK

Sets Precast Sewer Chambers On Underwater Foundations



CARRYING 77-TON PRECAST CHAMBER on side falls, 250-ton-capacity floating derrick eases toward shore line between boat-basin wall in foreground and ice-breaker pile dolphins at right. Slotted keys in face of chamber will be used in making doweled and grouted connection with concrete wall around existing sewer outlet.

BY PRECASTING concrete overflow chambers weighing 77 and 97 tons for two Hudson River outfall sewers, New York City, and setting the chambers with a floating derrick on underwater foundations alongside a bulkhead wall through which the sewers formerly emptied, the Merritt-Chapman & Scott Corp., contractor, avoided the twin difficulty of bypassing the sewage flow and cofferdamming the sites to permit construction in the dry. The 250-ton-capacity floating derrick *Monarch* set the chambers on consecutive days, the 77-ton box at 79th St. and the 97-ton box at 72nd St. Within two weeks thereafter the contractor completed grout seals connecting the sewers through the boxes with outfall extensions already placed on the bottom of the river. By this temporary relief measure, the Bureau of Sewage Disposal of the New York City Department of Public Works conveys the sewage several hundred feet beyond its former point of discharge and corrects an insanitary and unsavory condition fronting the new West Side Park. An interceptor and cross-town main to an enlarged treatment plant on Ward's Island, in the East River, are planned for the future and will be constructed as soon as funds are available.

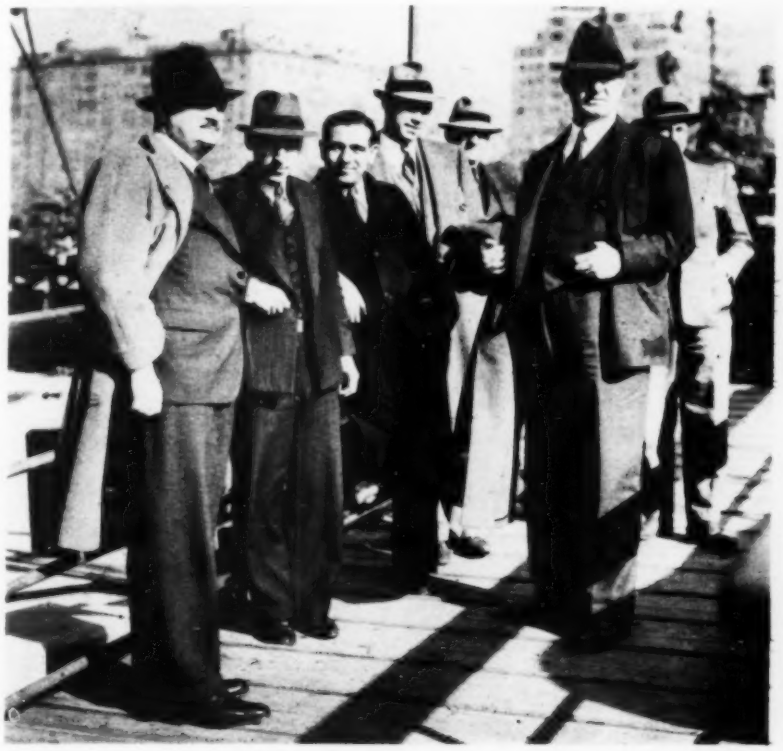
Accompanying photographs illustrate the contractor's procedure in setting the 77-ton spillway chamber of the 79th St. sewer. Similar methods were employed the following day in placing the 97-ton chamber of the 72nd St. sewer. The two sewers carry both sanitary sewage and stormwater, and spillway chambers are necessary to take care of excess storm flow at the points where sewage enters the river and drops to the underwater outfall extensions. Before setting the chambers, the contractor completed these extensions, of 5-ft.

FOUR SLINGS (below), pinned to double ship channels cast in base of chamber, suspend 12½x17x14-ft. box from side falls. In placing 97-ton chamber on following day, contractor uses four longer slings suspended from main falls.

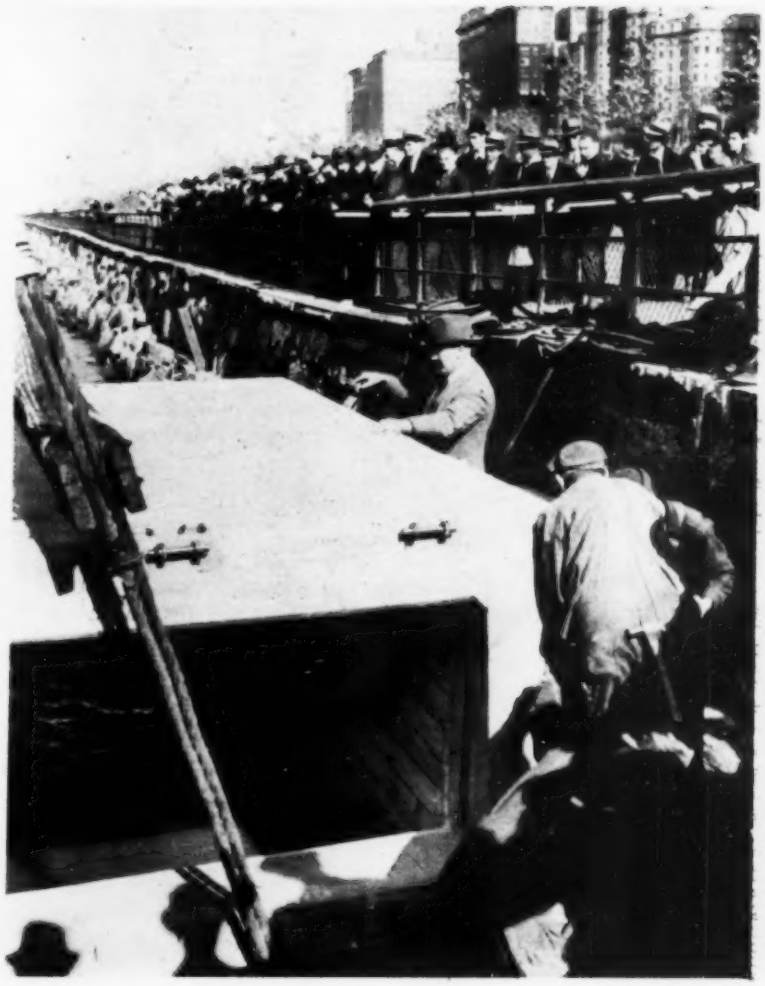
POISED ABOVE PREPARED FOUNDATION (below) in front of existing sewer outlet, precast chamber is lowered to pile-supported concrete base under water. As box goes down, it is rotated slightly and is guided into position to match opening in floor of box with open end of underwater sewer extension previously constructed.

DIVER GOES DOWN (below) to inspect position of chamber on base. Bottom elevation of chamber is about 4 ft. below mean low tide and about 9 ft. below mean high tide. Grout holes in floor of precast chamber are used to make grouted seal between box and foundation slab. Chamber is leveled on slab with aid of shims.

REPRESENTATIVES of Bureau of Sewage Disposal, New York City **(below),** gather to see chamber set in position: (left to right) HENRY LIEBMAN, engineer of design; LEONARD F. JOHNSON, resident engineer; HERMAN J. SEIDMAN and JOHN E. BYRNES, inspectors in charge at site; and HENRY C. GAFFNEY, construction engineer.



NO ORCHESTRA LEADER could have more attentive audience than H. T. TITUS, superintendent **(right),** as he directs lowering of precast spillway chamber.



precast reinforced-concrete pipe resting at invert El.-30 on timber pile bents driven in the mud bottom of the river. At 79th St., the extension is 325 ft. long and is deflected upstream at an angle of 18 deg. The 72nd St. extension is 500 ft. long.

For the New York City Department of Public Works, Irving .V. Huie is commissioner, and Richard E. Gould is acting deputy commissioner of the Bureau of Sewage Disposal. The outfall extensions were built under the direction of William R. Barry, district engineer for Manhattan and The Bronx, with Leonard F. Johnson as resident engineer.

Operations of the Merritt-Chapman & Scott Corp., contractor, New York City, were directed by Frank W. Barnes, construction manager, with Connie Vermont, project manager, and H. T. Titus, superintendent, in charge of the job.

California Tests REFLECTORIZED HIGHWAY MARKERS

UTILIZING white painted sight posts already in place, the California Division of Highways has mounted lucite reflector buttons on both sides of the posts bordering the Bay Shore Highway between South San Francisco and Burlingame to test the efficacy of the reflectors in aiding night driving. The posts are spaced 100 ft. apart on tangents and 50 ft. apart on curves, 10 ft. from both edges of the pavement. By indicating the edges of the highway shoulders far in advance and by warning of the presence of obstacles through obscuration of reflector units, the reflectorized markers are expected to encourage the motorist to drive nearer the right-hand edge of the pavement and to enable him to avoid possible accidents.

REFLECTOR BUTTONS of molded plastic 1⅝ in. in diameter are mounted in three-button enameled frames on both sides of sight posts, about 40 in. above pavement grade, in experimental test of night delineation of roadsides. **AT NIGHT (left)** headlights of approaching cars actuate prismatic reflectors far in advance of vehicles.

LATEST PRACTICES IN PIPE-LINE WELDING

By W. B. POOR

Engineer, United Gas Line Co., Houston, Tex.

NEW FOUR-FLAME TIP (below) for position welding of pipe lines provides two flames for V preheat, one for rod preheat and one for actual welding

[A paper (slightly condensed) delivered before the thirty-ninth annual convention of the International Acetylene Association.]

A REVIEW OF RECENT PROGRESS made in the pipe-line field indicates three major phases of advancement: (1) Improvements in welding facilities with particular respect to new and improved tips and rod; (2) The field of stress-relieving of arc welds; (3) The development and widespread acceptance of "wrinkle bending."

Of particular interest to the pipe-line operator should be the comparatively recent development of a new 4-flame tip for bell-hole or position welding; a new 6-flame tip for double-jointing pipe and for roll welds; and a new low-alloy steel rod.

Multi-Flame Welding Tip

The four-flame welding tip consists of four separate flames or jets burning from a common head. Two small parallel flames are used to preheat the pipe ahead of the welding puddle, a third and larger flame preheats the welding rod, while the fourth flame accomplishes the actual welding. It is believed that this newly developed multi-flame tip is particularly adaptable to the making of position welds, and that in its design the objections found in previous multi-flame tips have been corrected.

Distribution of heat is far more efficient with this new tip. The relative position of the flames has been so designed that the only necessary movement of the blow-pipe is continually forward. The rod, however, must be manipulated slightly and in such a manner as to control the height and contour of the deposited metal, in order to obtain the desired bead. The speed obtained with this new tip on position welding is comparable to the speed obtained with the old type three-flame tip on a roll weld. No special technique is required for its use.

The six-flame welding tip is similar in design to the four-flame tip with the exception that it has two additional preheating flames. Four flames preheat the pipe, a fifth preheats the rod, and the sixth accomplishes the actual welding. Because of the greater and more effective application of the heat, the six-flame tip increases the welding speed on rolling welds, as compared to the speed obtained with the three-flame tip, from 35 to 70 per cent depending on the pipe size.

Low-Alloy Steel Rod

The development of the composition of welding rods has been aimed toward higher strength and greater ease of control in the welding operation. A new rod has recently been designed to give tensile strengths 10,000 to 12,000 lb. per square inch greater than rods previously used in pipe line welding, and yet retains sufficient ductility to meet all normal requirements. This rod has been developed for use with the new 4- and 6-flame tips for the welding of high-carbon pipe. In addition to its greater strength, it is believed that this new rod offers considerable resistance to over-heating in the molten state, and solidifies more rapidly than most rods previously used. These qualities in the new rod make for easier control of the welding puddle and in turn considerably increase the rate of welding.

Field Stress-Relieving of Arc-Welds

A comparatively new application of the oxy-acetylene blow pipe which may assume considerable importance in the future is that of "stress-relieving" arc-welds in the field. Certain classes of arc welding, because of the extremely rapid heating and cooling of the metal, tend to develop and hold high internal stresses in the weld itself. Where an installation is designed for extremely high pressures, subject to shock and vibration or a wide range of temperatures, good practice dictates that the weld be stress-relieved.

It has been found that certain types of this work can be effectively and economically stress relieved in the field by an oxy-acetylene flame. A complete stress relief will result from heating the metal to about 1,200 deg. F. and varying amounts of relief take place at temperatures ranging downward from that point. Insufficient work has been done on this problem to date to give a final and conclusive picture, although several instances of its application have been entirely successful.

Wrinkle-Bending

By far the most interesting development in recent years in the field of pipe-line construction is the development of the practice of "wrinkle bending." Wrinkle bending is a modification of the creased bend and corrugated tangent which has, for some years, been in use in the fabrication of steam power plant piping. In 1935 the wrinkle bending of large-diameter, thin-wall pipe was applied to a low-pressure casinghead gas gathering system in the East Texas field. Its application to pipe-line construction has rapidly gained momentum, until today its wide usage is acceptable construction on practically all major gas transmission lines.

The advantages of the wrinkle

bend are many and the saving in dollars to the pipe-line constructor is apparent, although sometimes difficult to enumerate in detail. The wrinkle bend may readily be applied on any sag-bend, over-bend or side-bend, thereby replacing the conventional "cold" or "fire" bend that at one time was standard practice. Its use eliminates unwieldy equipment and a large portion of the high labor cost that was incurred by the bending crew.

Wrinkle bending has the further advantage of overcoming one of the main objections of the pipe-line constructor to the use of light-wall, high-carbon pipe, since all types of bends may be made in the field, on such pipe, with the same degree of ease that such a bend may be made on mild steel pipe. On the other hand, cold bending of thin-wall, high-carbon pipe is most unsatisfactory because of the fact that such pipe is inclined to spring, without taking a "set," to such a point that it will collapse.

Preparation of Wrinkle Bend

The preparation of the wrinkle bend is comparatively simple and the procedure is essentially the same for all sizes of pipe. It consists in heating with regular oxy-acetylene blow-pipe one or more narrow bends of metal at right angles to the longitudinal axis of the pipe. The large-capacity, multi-flame blow-pipe, designed for heavy heating operations, is particularly adaptable to this work. On pipe under 6 in. in diameter one torch supplies sufficient heat to prepare the pipe for bending. On pipe 6 in. in diameter and larger, a more satisfactory bend is made with the use of two flames and on sizes 10 in. and above such practice is essential. The band of heat should be 2 to 3 in. wide at the point of bending and should extend equidistant from the point of bend until the heated band extends one-half to two-thirds the circumference of the pipe, tapering to a point at the termination of the heated area. The pipe should be heated to a bright red, at which temperature the "critical range" of the metal is reached and the pipe is not strained as in cold bending. At this point the pipe is bent by hand, tractor or bending rig, until the heated portion buckles sufficiently to give the pipe a predetermined offset bend.

Good practice would seem to indicate that a 5-deg. bend per wrinkle is a maximum and that a 2 to 3-deg. bend per wrinkle is better. The number of wrinkles indicated, therefore, is predetermined by the total degree of bend required. At no time during the process of making the bend, or afterward, should the pipe be artificially cooled or quenched. Should high-carbon pipe be artificially quenched, in all probability the bend or wrinkle will crack, due to sudden chilling of the metal. If possible, the spacing of the wrinkles should be at least one pipe diameter apart. This is, however, not mandatory as 24-in. Grade B seamless pipe, having a wall thickness of 5/16 in., has been successfully bent approximately 28 deg. with 5-deg. wrinkles spaced 8 in. on centers. Such practice should be followed only in special cases.

A review of some actual experiences in the application of wrinkle bending may be of interest. On a recently constructed section of 18-in. main line, on which Grade B seamless pipe was used, the regular or long-radius bending was first attempted. A great deal of difficulty was incurred in bending the high carbon pipe by conventional methods as extremely long sweeps were required, necessitating careful grading of the ditches and excessive excavation. With even these precautions, several of the bends failed by buckling before the desired curvature was reached. Wrinkle bending was then resorted to with a result that the work was speeded up, construction costs were lowered and no bend failures occurred.

Comparison of Two Bend Crews

A comparison of the two types of bend crews follows:

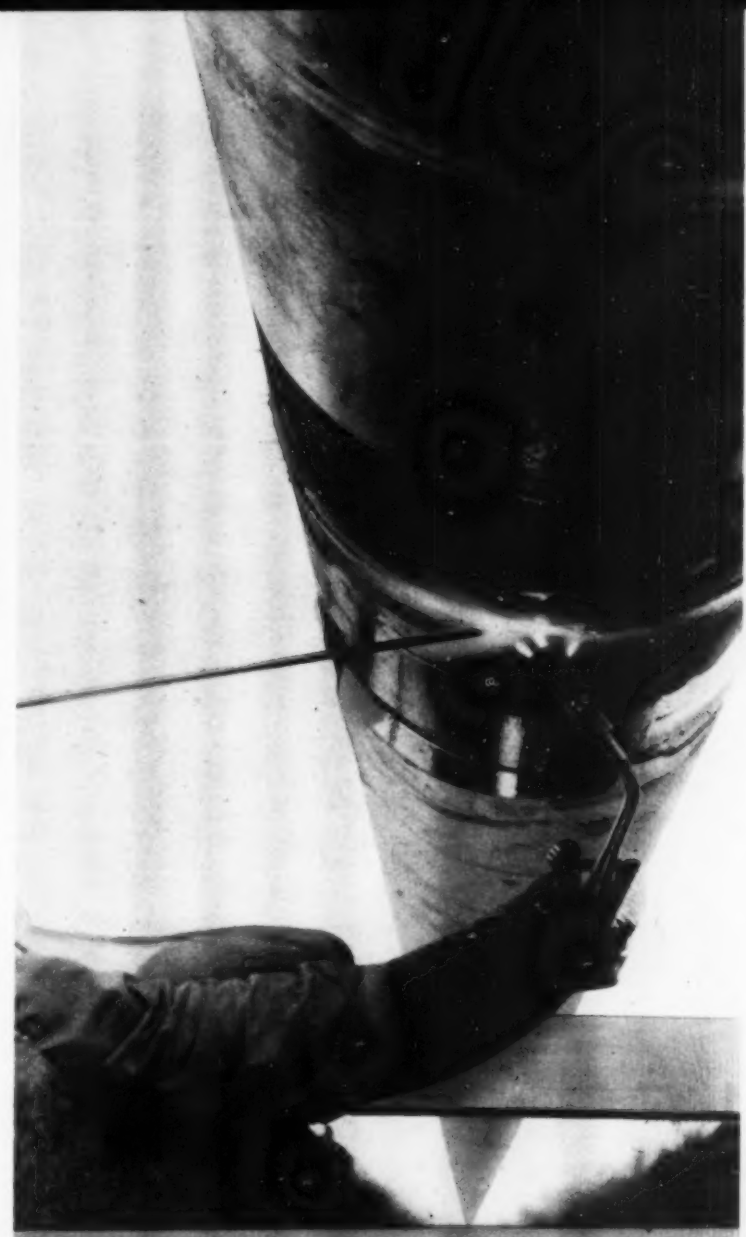
Regular or Long Radius Bending Crew — PERSONNEL: 1 foreman; 1 truck driver; 1 air compressor operator; 10 laborers. EQUIPMENT: 1 air compressor; 2 Johnson burners; 1 truck (carry tackle, kerosene, etc.); bending block and miscellaneous tackle.

Wrinkle Bending Crew—PERSONNEL: 1 foreman; 1 welder and helper with acetylene torch; 1 tractor driver; 2 laborers. EQUIPMENT: 1 tractor; 1 sled attached to tractor to carry acetylene torches, etc.

A comparison of the two crews indicates that a tractor was substituted for a truck, the air compressor and Johnson burners and heavy bending equipment were eliminated and the crew personnel was reduced from 13 to 6.

Under both methods of bending, the work was done after the pipe had been welded into a 120 to 160-ft. sections. While the number of bends per crew per day is not constant, and is dependent upon so many factors, the construction records revealed that the number of bends prepared by the regular bending crew ranged from 8 to 12 per day, whereas the wrinkle bending crew averaged 12 to 16 complete bends per day.

A summary of the advantages to



BELL-HOLE WELD is made in overhead position with four-flame tip.

PREPARATORY TO WRINKLE BENDING of pipe line (below), two operators heat narrow band at right angles to pipe.

Gain a Full Working Day

New Positive-Seal Truck Wheel Assembly Eliminates Daily Lubrication. Also Saves Mechanic's Time and Big Lubrication Bills.

No longer need you stop your tractors every shift to grease front idlers and truck wheels. The new positive-seal idlers and truck wheels on the Models "S" and "S-O" (64 H. P.) tractors are built to operate *200 hours on a single lubricction.* Exhaustive tests in the field and laboratory prove they'll do it. Take a look at these figures and see what this means to you:

Ordinary 60-70 H. P. tractors require 7½ lbs. of grease for rollers and idlers every ten hours —150 lbs. in 200 hours. Cost at 8c per lb.* is $12.00. Each greasing takes 30 minutes or 10 hours out of every 200.

Compare these with "S" and "S-O" figures. Now you lubricate the front idlers and truck wheels but *once in 200 hours.* Only 2¼ gals. of lubricating oil at 50c per gal. are necessary — cost $1.12. Lubricating time, ½ hour.

You gain 9½ operating hours in every 200 on lubricating time alone—plus $10.88 on lubricating costs. You can do without the grease monkey or use his labor on other important maintenance. Another money-making advantage pioneered by Allis-Chalmers!

Start saving money NOW with "S" and "S-O" tractors. See for yourself . . . on your own job . . . what these big, fast-moving tractors can do. Ask your Allis-Chalmers dealer to demonstrate.

*** Prices in most states run 10 to 12c.**

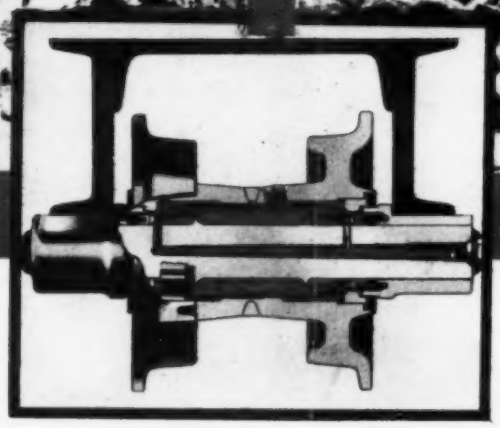
ALLIS-CHALMERS POWER

TRACTOR DIVISION—MILWAUKEE, U.S.A.

TRACTORS, ENGINES, ROAD MACHINERY

.. IT DOESN'T COST .. *it Pays!*

ay Every 200 Hours...



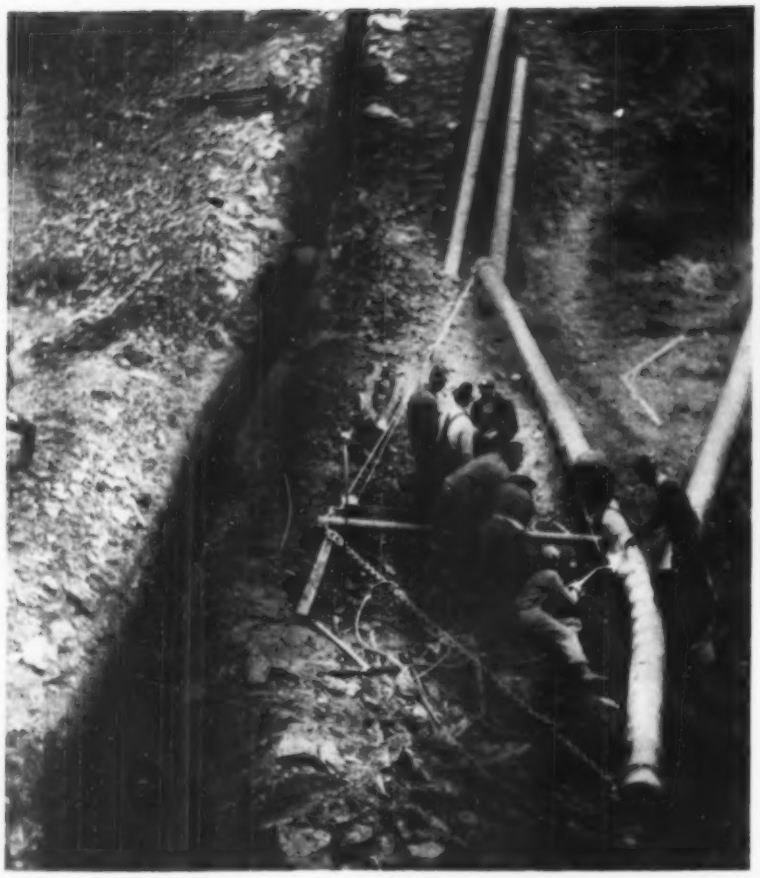
AVOID COSTLY SHUTDOWNS—The bearings in this new truck wheel assembly are tapered roller bearings, with a positive-seal to keep in the oil; keep out dust, dirt, mud and grit. Life of the assembly is greatly prolonged; shutdowns for truck wheel repair are practically eliminated.

SAVE 17¾ DRUMS OF LUBRICANT ... GAIN 475 PRODUCTIVE HOURS

In 10,000 working hours, the ordinary 60-70 H. P. tractor uses 7500 lbs. of grease for rollers and idlers or about 20 full drums ■■■■■■■■■■ ■■■■■■■■■■ An "S" or "S-O," with the new positive-seal truck wheel assembly, will require only 2¼ oil drums ■■□ You save 17¾ barrels or from $544.00** to $844.00+ on grease alone during this time ... *plus a gain of 475 operating hours — more than 2 working months* ! A nice operating discount — possible only with Allis-Chalmers tractors!

ALSO AVAILABLE ON "M", "K" AND "K-O" TRACTORS — The positive-seal truck wheel assembly—exclusive with Allis-Chalmers — is also standard equipment on the Model "M" (32 H. P.), "K" (50 H. P.) and "K-O" (54 H. P.). Similar savings on grease ... similar gains in working time.

**Figured with 8c grease.
+Figured with 12c grease.



PIPE BENDING TOGGLE RIG is operated by winch. Two men in center are taking up on winch, causing heated section of pipe to "wrinkle."

THIRTEEN WRINKLES were required to give this pipe section its total bend of 35 deg.

"ANGLE FINDER" (below) assures that bend in pipe conforms with angle in trench.

be obtained from wrinkle bending, on pipe lines or in station work, as compared to the conventional method of field pipe bending are in part as follows:

(1) Wrinkle bending is the only satisfactory method of bending light wall pipe.

(2) It is the only satisfactory method of bending high carbon pipe.

(3) Mill coated or yard coated pipe may be bent in the field with far less damage to the protective coating, resulting in economic saving.

(4) On pipe line construction, where only occasional and small degree bends are required, such bends may be made by the same crew and equipment employed in the laying gang, without materially delaying the progress of the work.

(5) A great deal of excavation and time can be saved in rough country as the pipe can be readily wrinkled to fit almost any contour of the ditch rather than having to grade the ditch very carefully to fit the bend or to take great pains in bending the pipe to fit the ditch.

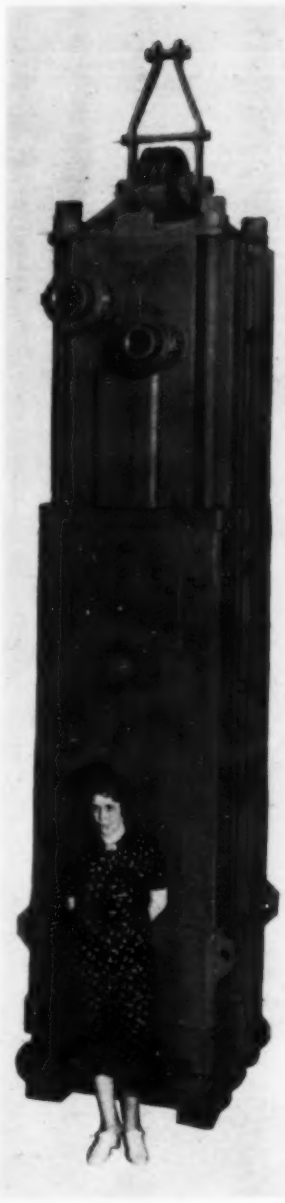
(6) From an engineering standpoint, of special importance is the fact that the pipe wall opposite the bend is not thinned from its original thickness and at the point of wrinkling compression squeezes the pipe so that the metal is slightly thicker than the original wall. Furthermore, with this type of bend, the cross section of the pipe receives no distortion provided the bend is properly made.

(7) Wrinkle bending adapts itself particularly well to the stove pipe method of constructing pipe lines.

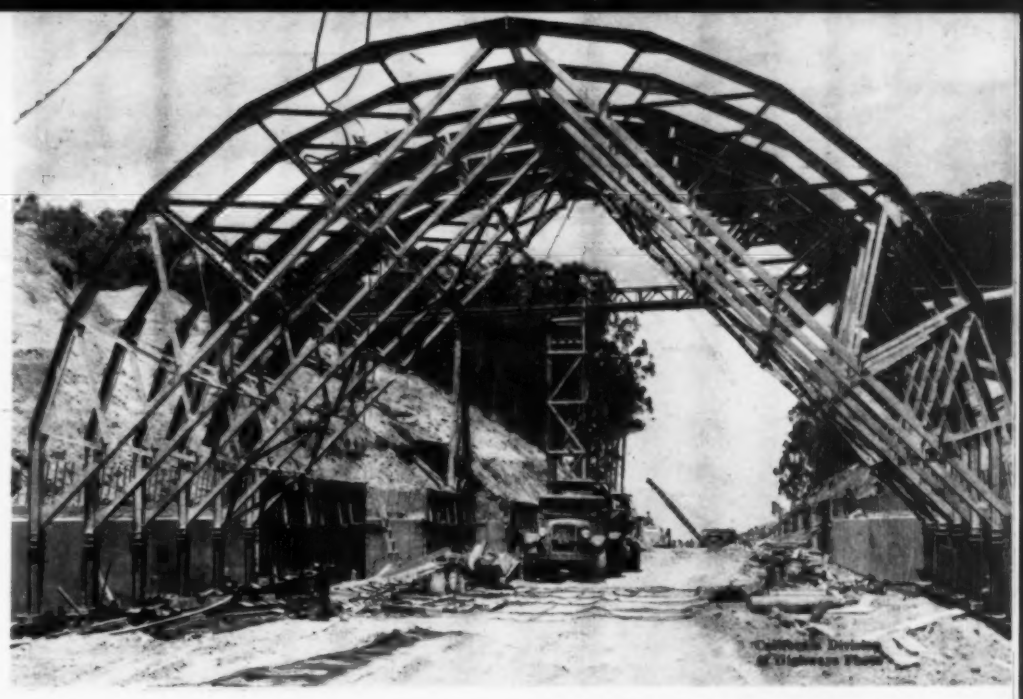
SKID ATTACHMENT

Unloads Pipe From Truck

A SKID hooked to the rear end of a flat-bed truck unloaded concrete pipe without breakage as the truck moved ahead slowly on a sewer job recently completed at Englewood Cliffs, N. J., by Kemp Bros., Inc., Ridgefield, N. J. Rock trench for the pipe was drilled by a drifter mounted on a special horizontal bar attached to a tractor, as described in Construction Methods and Equipment, April, 1939, pp. 58-59.



16-TON STEAM HAMMER (left) heaviest single-acting unit ever built, is manufactured by McKiernan - Terry Corp. for Merritt-Chapman & Scott Corp., contractor, to meet engineers' specifications for driving 175-ft. steel piles in foundation of Potomac River bridge, Ludlow Ferry, Md. At 100-lb. steam pressure, 7-ton ram delivers 55 to 60 blows per minute, falling 32 in. to develop blow of 37,500 ft.-lb. Hammer measures 3x3 ft. by 14 ft. high, including driving cap.



FOR CUT-AND-COVER TUNNEL of Funston Ave. approach to Golden Gate bridge, San Francisco, Macco Construction Co., contractor, erects steel jumbo to carry forms for concrete arch over four-lane highway, which runs in tunnel for 1,300 ft. under Presidio golf course and Washington Boulevard.

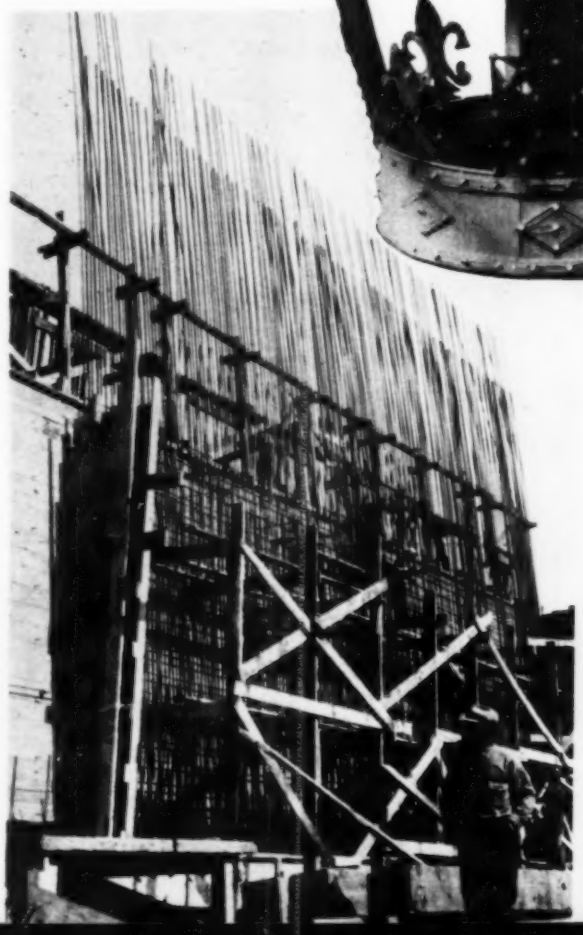
JOB ODDITIES

A MONTHLY PAGE OF

Unusual Features of Construction

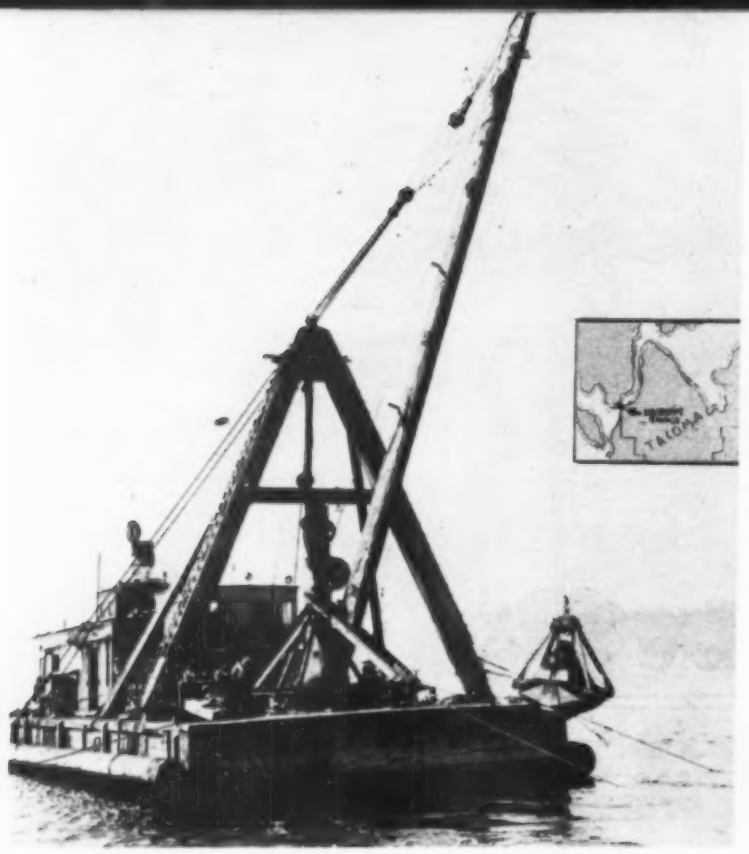
The Linde Air Products Co. Photo

1-TON WELDED CROWN (left), 20 ft. in height by 16 ft. in diameter, is fabricated with oxy-acetylene torches and raised to tower of pulp and paper company as tribute to Britain's rulers' on their visit to Quebec. Built of sheet metal, angle iron and pipe, crown supports silhouetted decorations cut and welded by gas torches.



REINFORCEMENT APLENTY (left), spaced close enough to suggest a field of grain, goes into one of rigid frame concrete bridges which carry approach ramp of Meeker Ave. bridge, Brooklyn, N. Y., over intersecting streets. In foreground, NATHAN DEUTSCHMAN, resident engineer for New York City Department of Public Works, casts appraising eye over formwork set by Reiss & Weinsier, Inc., Brooklyn, contractors.

PARACHUTE JUMPERS (below) make 250-ft. drop from top of steel tower in New York World's Fair amusement area. Vertical ropes guide descent of individual parachutes.

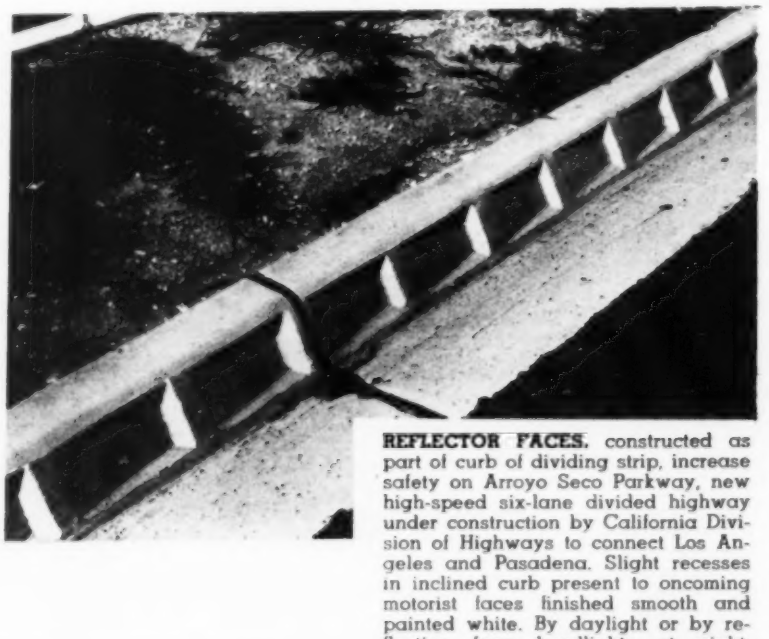


DEEP DREDGING to level off sloping gravel bottom 135 ft. below high tide for landing false-bottom caisson of east tower pier for Narrows suspension bridge, Tacoma, Wash., involves removal of 10,000 cu.yd. by 2-yd. Owen bucket operated by floating derrick. Tidal currents approach 8½ m.p.h., and bucket ordinarily is opened under water to let current carry spoil beyond site. Bridge contract for $5,950,000 is held jointly by Pacific Bridge Co., San Francisco; General Construction Co., Seattle, and Columbia Construction Co., Portland.

ROLLING SCAFFOLD supported from bridge rail aids workmen of Duffy Construction Corp., contractor, in stripping sidewalk forms from viaduct approach crossing New Jersey meadows to Lincoln Tunnel under Hudson River.

How They Did It

CONSTRUCTION DETAILS *For Superintendents and Foremen*



REFLECTOR FACES, constructed as part of curb of dividing strip, increase safety on Arroyo Seco Parkway, new high-speed six-lane divided highway under construction by California Division of Highways to connect Los Angeles and Pasadena. Slight recesses in inclined curb present to oncoming motorist faces finished smooth and painted white. By daylight or by reflection from headlights at night, bright white line is created to serve as driving guide and warning along left road-edge. Section shown is in South Pasadena, where construction has been completed by J. E. Haddock, Pasadena contractor.

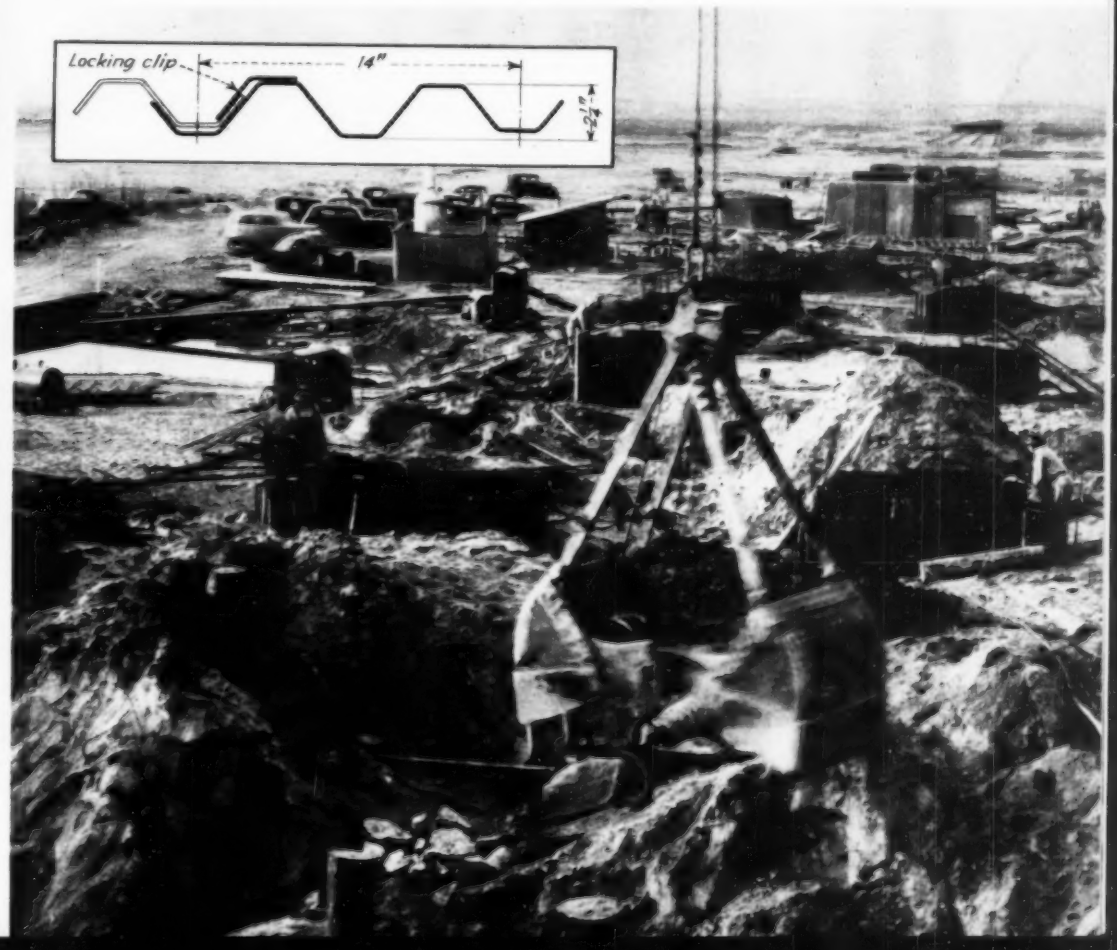
SMALL RIVER TOW-BOAT (left), designed and built by Dravo Corp., of Pittsburgh, Pa., for marine construction service, measures 45x11x5¾ ft. and is readily loaded and transported overland on single railway flat car after top of pilot house and towing knees are knocked down. Boat is of all-welded steel construction and is equipped with Kort nozzle and three rudders for maximum power and maneuverability. Power is supplied by 125-hp. Waukesha Hesselman engine turning a 38x31-in., four-blade propeller at 500 r.p.m. Fuel tank holds 1,000 gal., enough for 111 hr. running at maximum speed.

SPECIAL STEEL FORMS enable Elmhurst Contracting Co. to pour in one operation concrete for combined curb and guard rail on northerly approach to Meeker Ave. bridge over Newtown Creek, Brooklyn, N. Y.

THREE-DIMENSIONAL ILLUSION is created by letters painted flat on street but designed by mathematical formula to stand up from pavement, making them visible to motorist at distance 150 ft. greater than conventional painted pavement sign. Designed by Frank McLaughlin, Chicago industrial designer, letters are here being applied at 57th St. and Dorchester Ave., Chicago.

FOR NIGHT WORK in constructing New York City's 550-acre airport at North Beach, Long Island, involving placing by 290 trucks of many thousands of cubic yards of fill, WPA forces, working in three 8-hr. shifts, make use of more than 200 National Carbide portable floodlights, pending installation of electric lines at site. Under guidance of special crew, these lights are charged regularly at central shack, delivered by truck to points of use, inspected, and repaired when necessary. Photos show lighting units set in place ready for use and group of generators collected for recharging.

WEDGE-LOCK STEEL SHEETPILING (below) is employed by Forcum-James Co., contractor, of Dyersburg, Tenn., on pier substructures for 83 bents of Red River bridge at Oklaunion, Tex. Depth of pit excavation averages 14 ft. Angular sides of two interlocking corrugations of 14-in. sheetpiling, supplied by O.K. Harry Steel Co., St. Louis, Mo., are in positive contact throughout full length of pile. Act of driving sets up wedging action in joint which forces adjacent piles tightly together. Locking clips at joint act as guides during driving and form tight connection.

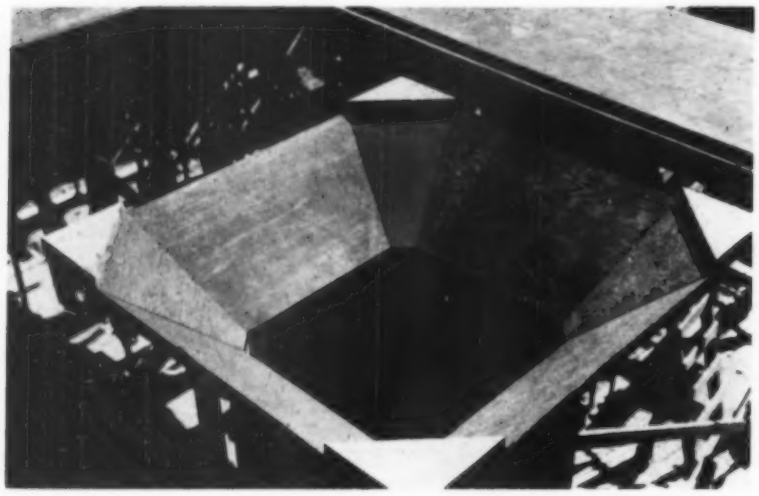


Step by Step

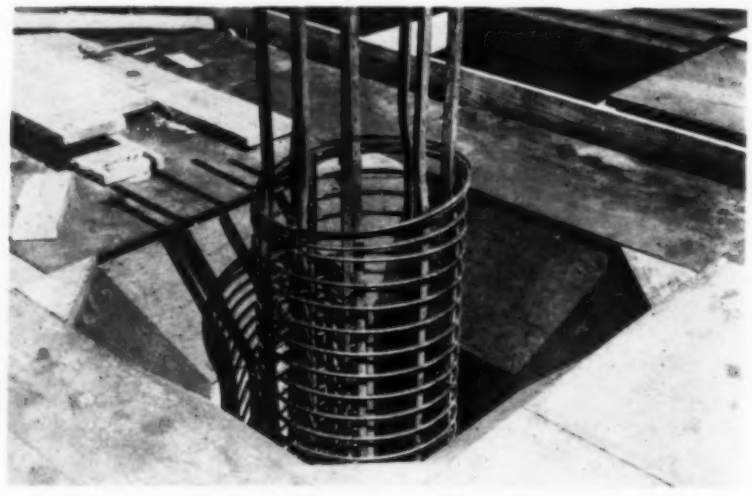
Column Construction

In Reinforced-Concrete Building

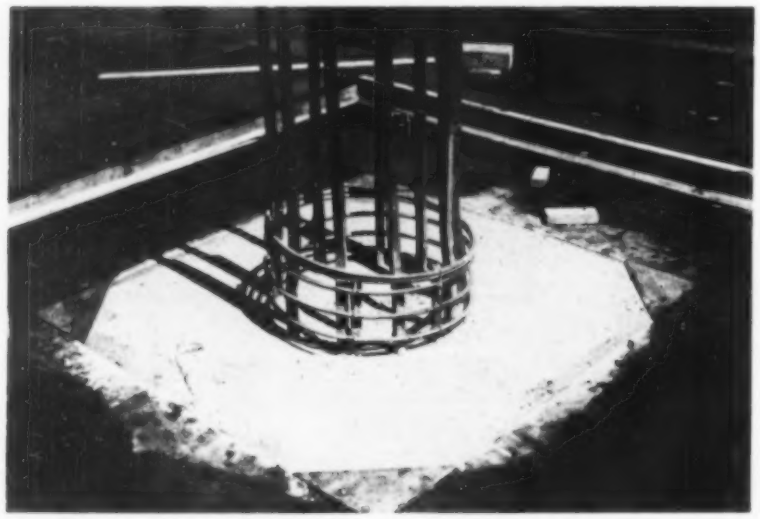
CAREFUL FORMWORK for exposed concrete columns of the new Sears-Roebuck & Co. building on Chicago's northwest side equalled in quality the forms for architectural concrete walls of the same building, described in CONSTRUCTION *Methods and Equipment*, Jan., 1939, pp. 42-43-46. Accompanying photographs illustrate steps in placing reinforcing steel and concrete in typical columns 24 in. square. The Lundoff-Bicknell Co., of Cleveland, general contractor, erected the building according to plans by Nimmons, Carr & Wright, of Chicago.



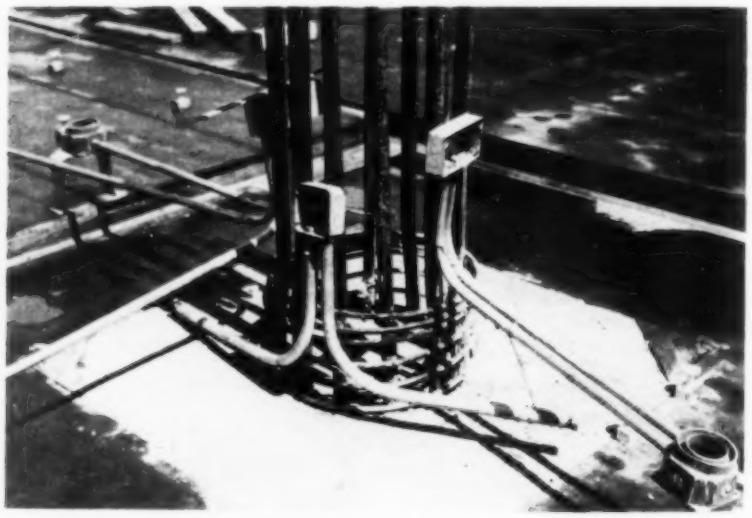
(1) **FLARED EIGHT-SIDED FORM** for capital tops column form.



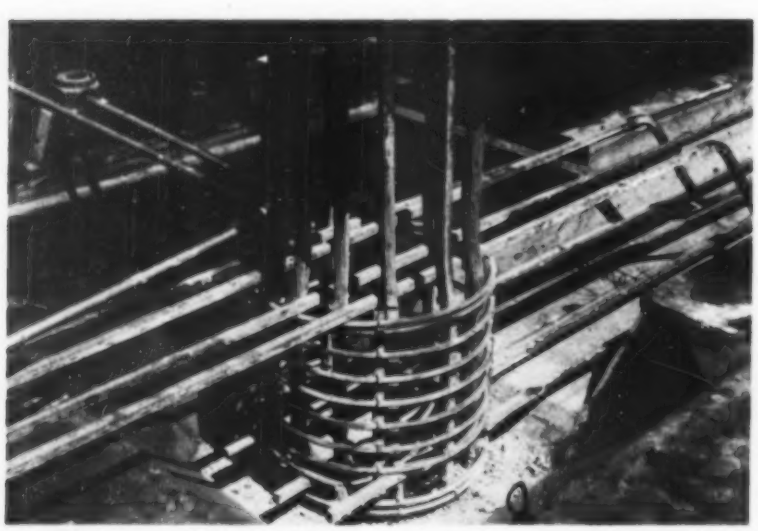
(2) **REINFORCING CAGE** of vertical rods and spiral steel is set inside column form.



(3) **COLUMN FORM** is filled to top of flared capital, flush with drop panel.



(4) **BEFORE STEEL SETTERS** place slab reinforcement, electricians install conduits and outlet boxes.



(5) **WHERE GIRDER** ties into column, girder reinforcement is placed ahead of slab steel.

(6) **WITH FLOOR REINFORCEMENT** in position, concrete crew places slab around column.

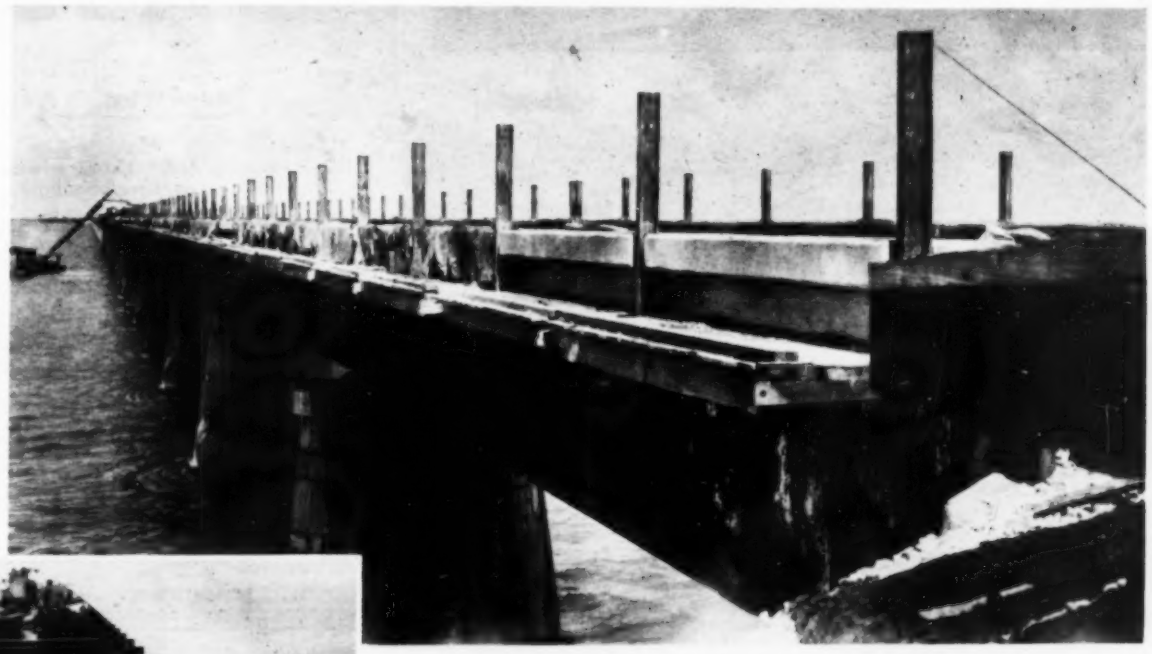
OVERSEAS HIGHWAY

Rides on Reconstructed Bridges

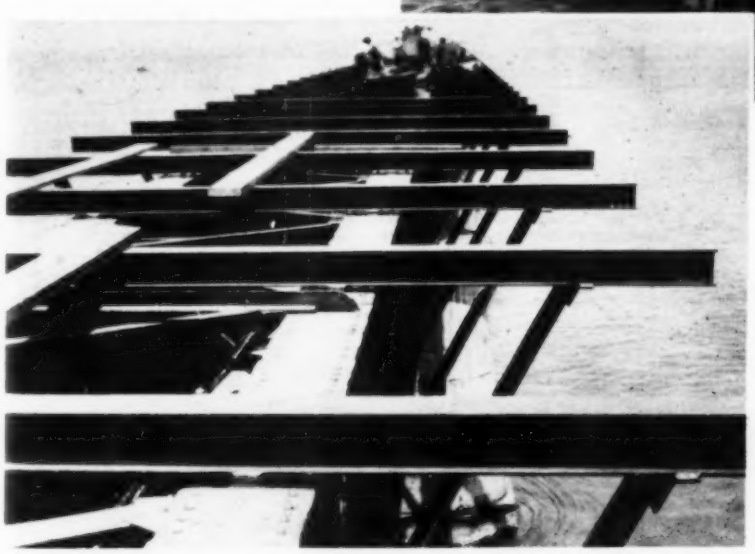
HOW CONTRACTORS ON FLORIDA TOLL ROUTE BUILT ROADWAY DECK ON STEEL PLATE GIRDER AND THROUGH-TRUSS STRUCTURES

REVAMPED AND WIDENED PLATE-GIRDER SPANS carry 20-ft. roadway deck of Overseas Highway across Florida Keys.

RECONSTRUCTION AND WIDENING of three types of railroad bridge—concrete arch, steel deck plate-girder, and steel through-truss—were involved in converting a 33-mi. section of the abandoned right-of-way of the Florida East Coast Railway into the new Florida Overseas Highway, extending from the mainland over the ocean and along the Florida Keys south to Key West. Methods of revamping the concrete arch type of railroad bridge for highway use were described in CONSTRUCTION *Methods and Equipment* for July, p. 68. Supplementing that description the following notes tell how the work on bridges of the steel plate-girder and through-truss types was handled.



FORMS IN PLACE for concreting roadway deck on plate-girder spans, showing overhang to provide catwalk for workers.



TO CARRY ROADWAY, transverse steel I-beams, and inclined brackets are welded to existing plate-girders of old railway bridge.

Building Deck on Steel Girder Spans—Details of the general design of the deck placed on 80- and 60-ft. steel girder spans to carry a 20-ft. roadway are shown in an accompanying drawing. The first operation was to place 8-in. steel I-beams on the girders of the original structure to carry the concrete highway deck. Delivery of the steel was made to a storage yard at the end of the bridge by trucks hauling from the railhead to the mainland. From this yard the steel was floated to place along the bridge on lighters, a derrick-boat spotting the beams so that comparatively little rehandling on the bridge was necessary.

At the intersection of the beams and the girders a 9x4-in. steel plate 1¼ in. thick was welded to the top of the bridge girder, and the I-beam in turn was welded to this plate, leaving a space of 1¼ in. between the top of the girder and the bottom of the I-beam to facilitate painting

FLOATING CONCRETE PLANT, fed with material by barges, **(above)** delivers mix to roadway deck by pipe line **(below)** from Pumpcrete outfit.

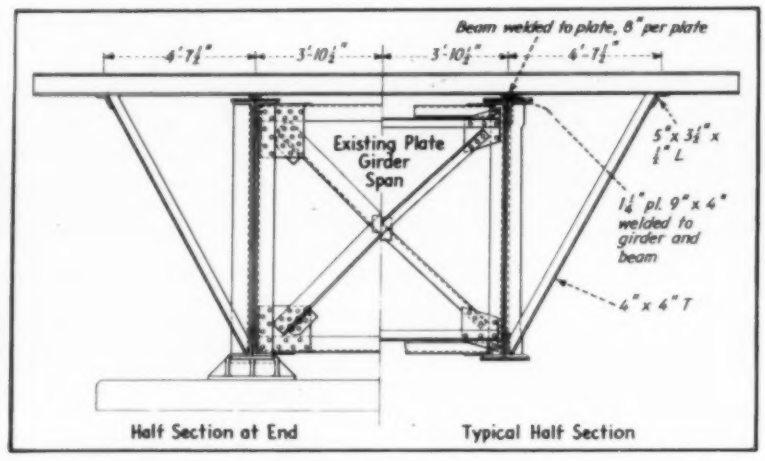
STEEL FRAME TRAVELERS of several types **(above and below),** operating on pneumatic-tired wheels, provide working platforms below roadway without interfering with traffic on bridge.

all surfaces of the steel at the intersection. Crews of welders working from the structure without falsework made the connections between the beams and the girders, and also the weld between the knee-braces and the beams. Portable welding outfits were shifted along directly behind the welders on plank laid on the beams.

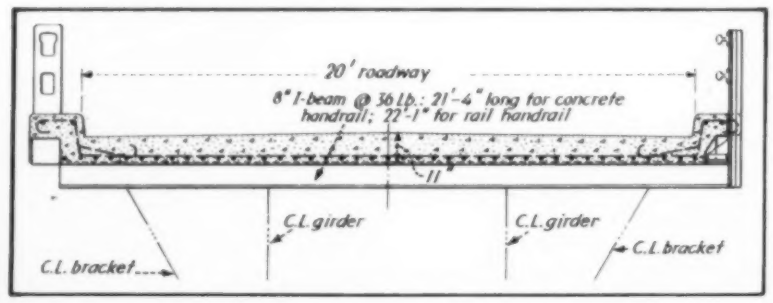
Forms for Deck Slab — Forms for the highway deck slab built on the I-beams set on the original steel railroad bridge girders were designed for multiple use. Framed flat sections of forms were built so that two of them, when slipped in between a pair of the 8-in. I-beams, made a continuous floor extending 2 ft. at both ends beyond the line of the posts of the bridge handrails. This provided a catwalk on both sides of the structure from which all subsequent operations could be handled to advantage. Sections of the forms were delivered along the bridge on lighters and hoisted to place by a floating derrick. Guided by men on the deck of the structure, a section of form could readily be slipped into position between the steel beams.

With pairs of sections in place between the beams, men working under them from the structure wedged the forms up to a tight fit under the top flanges of the I-beams. The joint between each pair of form sections was covered with a strip of sheet metal to make a seal. Forms for the side curbs of the deck then were set and reinforcing of the highway deck slab was placed.

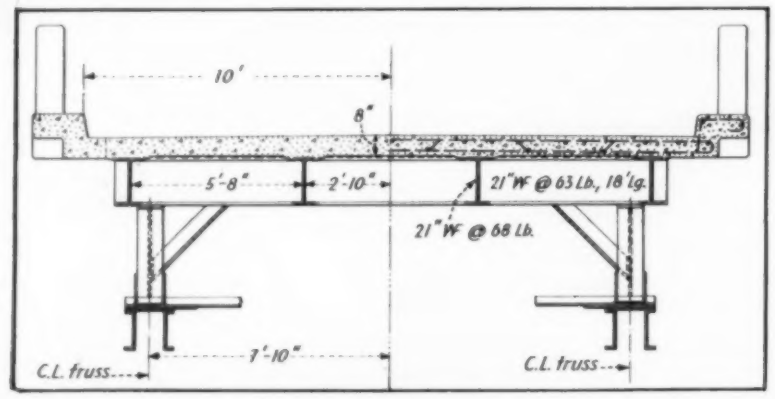
Concreting of Deck — Concrete for the deck on the steel girder spans



HOW I-BEAMS ARE WELDED to existing plate girders and supported by knee-bracing to carry roadway.



CROSS-SECTION OF CONCRETE SLAB which forms 20-ft. roadway atop steel plate-girder spans.



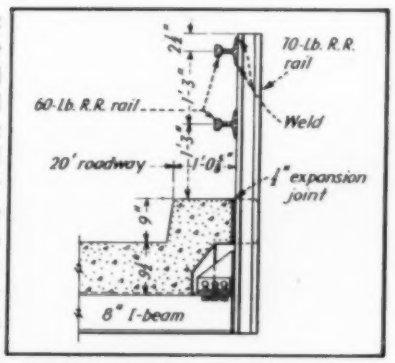
TRANSVERSE SECTION of floor system and concrete deck placed on top of 125-ft. through-truss spans of Bahia-Honda bridge.

was mixed in a floating plant that was shifted along the structure as the work progressed. A crane mounted on the mixing plant barge hoisted sand and stone to a batching plant over a Rex mixer which produced all of the concrete. From the mixer the concrete was delivered by pipe line to the point where pouring was in progress by a Pumpcrete outfit. The discharge pipe from the latter was carried by a boom, swung from the end of the mixing plant barge, that was long enough to reach up over the structure. A swivel spout on the end of the boom enabled concrete to be placed at any point on the deck desired. Concrete was poured continuously in the deck, expansion joints being placed over alternate beams of the supporting structure, with expansion joints between the sections. Concrete was mixed fairly dry, and a portable gasoline-engine tamper was used to get maximum density.

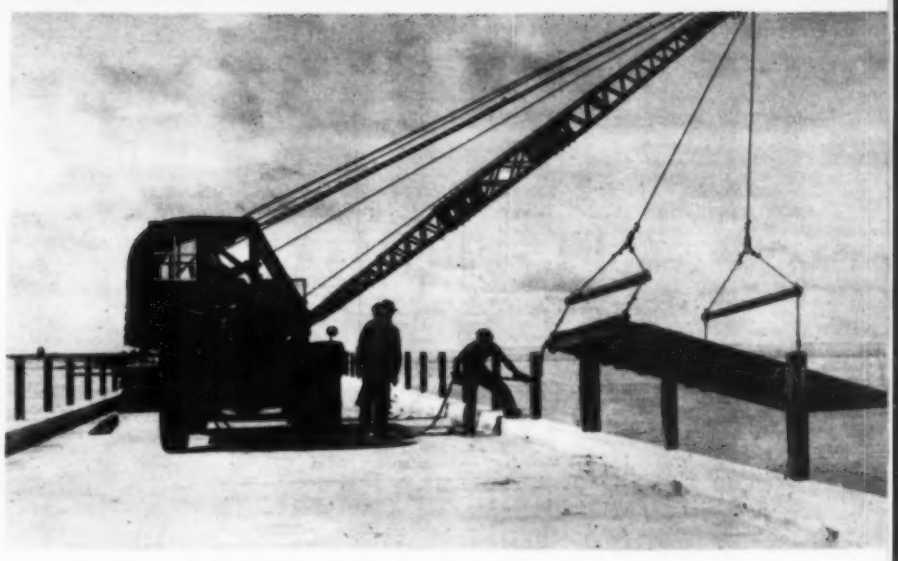
Regular operations were to shift the floating mixing plant along the structure so that delivery of concrete was close to the end of the boom of the plant. Where the bridge crosses a small island it was necessary, however, to pump concrete a maximum distance of 700 ft. from the plant.

Finishing Concrete Deck Surface—Finishing of the surface of the concrete deck was done by hand, the

(Continued on page 100)

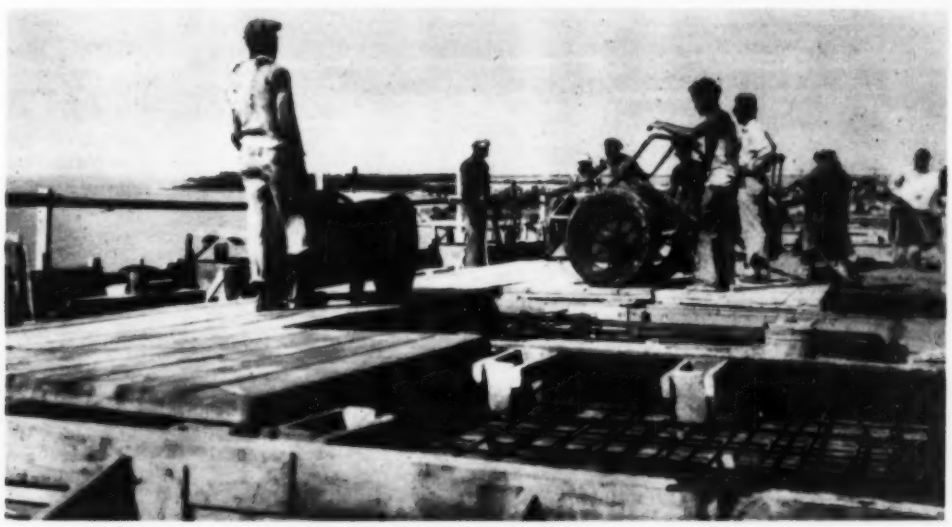


GUARD RAIL along roadway is formed of salvaged railroad rails welded to vertical posts.

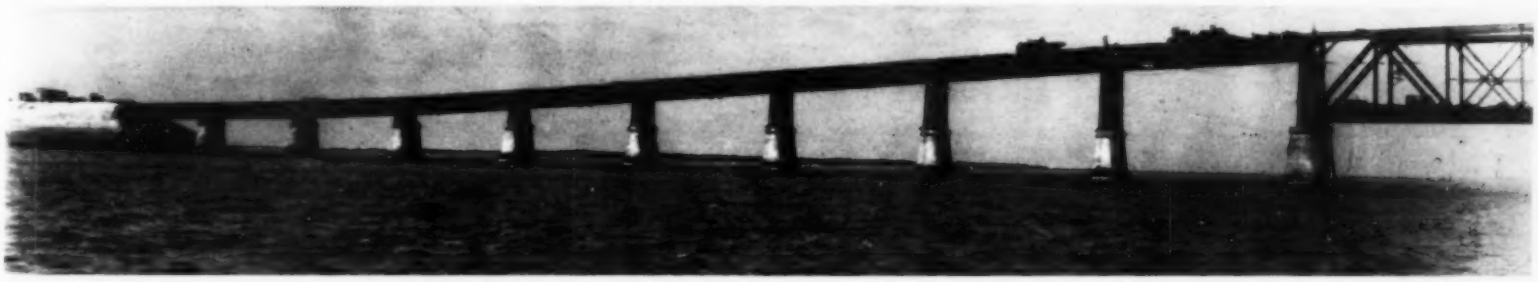


REMOVAL OF FORMS for concrete roadway is aided by use of truck-crane and bridle slings.

ATOP THROUGH-TRUSS SPANS of old railway bridge across Bahia Honda **(right)**, new concrete roadway deck is placed to carry Overseas Highway. Note steel frame traveler on wheels for stripping forms.



PORTABLE PLATFORM SECTIONS of wood provide runway and turnouts for rubber-tired buggies which deliver concrete to top deck of through-truss bridge spans.



RAISING OF PLATE GIRDERS by towers on old piers provide ramp approach to roadway atop through-truss spans.

PRESENTED ON THESE TWO PAGES is a selection of views from a sequence of 35 dioramas prepared by the U. S. Bureau of Public Roads for the Golden Gate International Exposition. The series pictures the story of the improvement of transportation in the United States from primitive Indian trails to high-speed automobile roads, during the last four centuries.

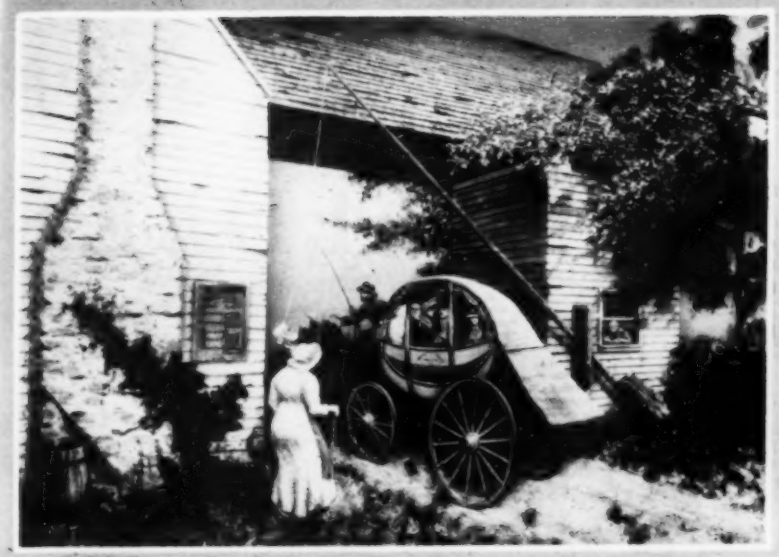
1760 ... TOBACCO-ROLLING ROAD. Southern planters of Colonial America roll their money crop in hogsheads from field warehouses over tobacco-rolling roads to river landings for shipment to England.

1763 ... BOSTON POST ROAD. Postmaster General Benjamin Franklin, starting out from New York in one-horse shay, accompanied by his daughter on horseback, makes tour of inspection of Colonial post offices. While on his way, he receives letter delivered by post rider.

1774 ... BOONE'S WILDERNESS ROAD. Just before Revolutionary War, Daniel Boone begins western expansion of American colonies by starting movement over his Wilderness Road through Cumberland Gap across Allegheny Mountains.

1809 ... NATCHEZ TRACE. Shortly before Louisiana Purchase, Congress orders opening of Natchez Trace from Nashville, Tenn., to Natchez on the Mississippi. Over this path flatboatmen travel homeward after floating their laden craft down Ohio and Mississippi to New Orleans.

1822 ... SANTA FE TRAIL. Starting from western frontier of United States at Independence, Mo., Santa Fe trail is first of overland roads to Far West. At starting point near Missouri River, traders tighten steel wagon tires in preparation for long journey across plains.



1830 ...**MAYSVILLE TURNPIKE.** This toll road through Blue Grass region of Kentucky recalls failure to win Federal aid for southwest branch of National Road from Zanesville, Ohio, to New Orleans. President Andrew Jackson vetoed bill.

1836 ...**EL CAMINO REAL.** Covered wagons, caretta carts and pack animals of settlers push southwestward over El Camino Real beyond San Antonio, Tex., past the Alamo which General Santa Ana and his Mexican troops stormed shortly before.

1846 ...**FIRST PLANK ROAD.** Among feeble experiments to better wagon roads, first plank road is opened to travel in 1846 from Syracuse, N. Y., to Oneida Lake. Like its successors, it lasts about ten years before rotting away.

1850 ...**DARK AGES OF ROAD TRAVEL.** By 1850, speed of fastest trains averages about 25 mi. per hour, and railroads are carrying passengers and freight over long and short distances. Conestoga-wagon and stage-coach companies are failing, and roads are often muddy, rough and almost impassable.

1857 ...**CAMEL EXPRESS TO CALIFORNIA.** Secretary of War Jefferson Davis in 1857 starts Lightning Dromedary Express between Albuquerque and Los Angeles to speed transportation to California gold regions. Easy-going camels imported from Egypt and Arabia provoke anger of impetuous American mule drivers.

1934 ...**GRADE SEPARATIONS.** Continuing the improvement of highways which began about 1900, soon after appearance of "horseless carriage," Federal aid speeds construction of bridges to separate grades at railroad-highway intersections. Fast traffic rolls over separated roadways of divided-lane highway.

TRANSFORMER-TYPE ARC WELDERS

Facilitate Noiseless Erection Of Hospital Frame

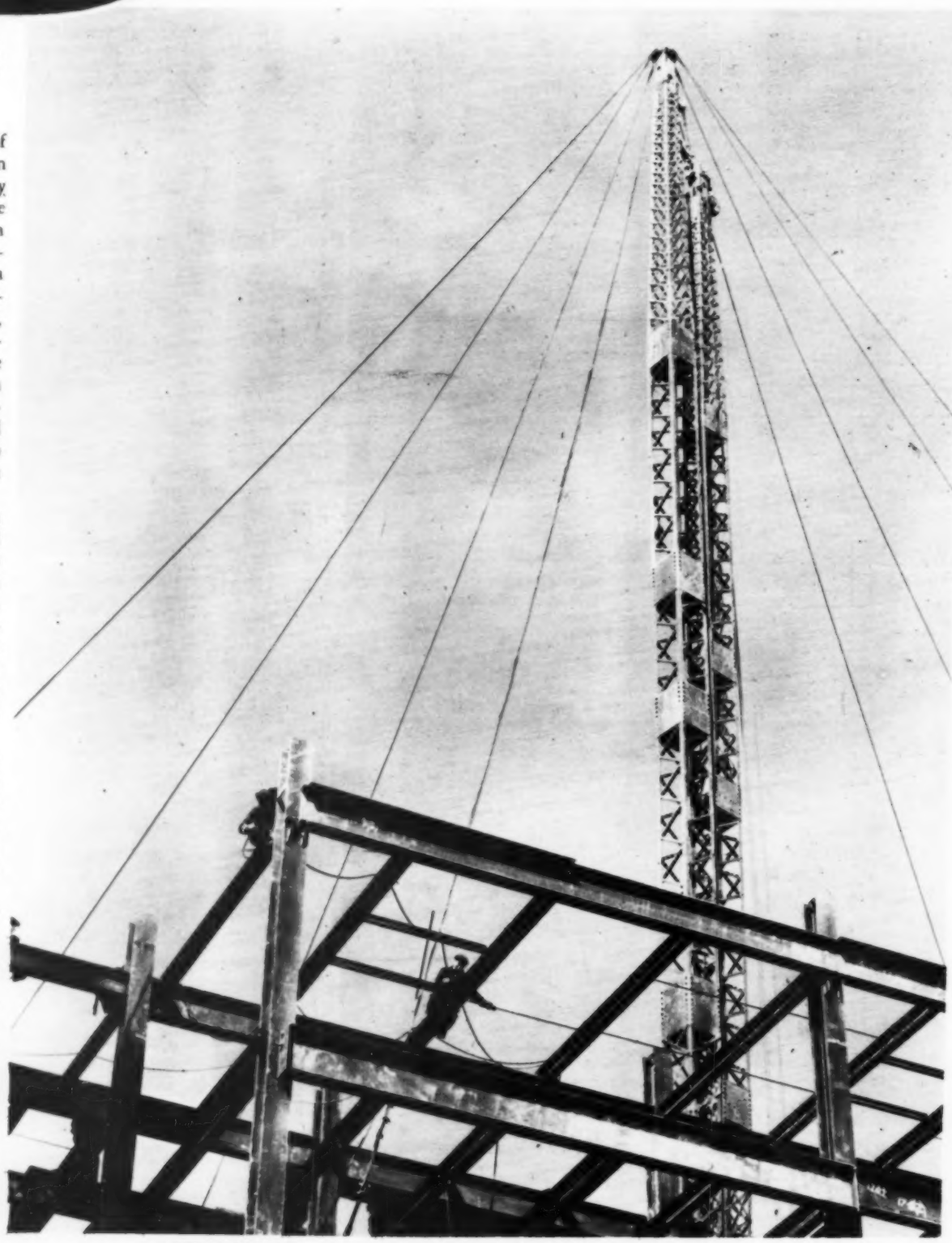
ELECTRIC WELDING permits noiseless erection of new thirteen-story hospital in Pittsburgh medical center.

FREED FROM THE NOISE of riveting hammers, the 1,000-ton steel frame of the thirteen-story Woman's Hospital, Pittsburgh, rose silently during 59 working days in the midst of the University of Pittsburgh's medical center. To meet a request by the hospital's board of directors that the structure be welded, the city council granted a special permit pending passage of an ordinance incorporating welding regulations in the building code. As the new building connects with one hospital and stands less than 200 ft. from two other hospitals, noiseless construction was highly desirable.

Replacing 15 tons of rivets which would have been needed in riveted construction, the welders used 2,300 lb. of welding rod and $300 worth of electric power to make the connections in the steel frame. The Duquesne Light Co. installed power service for Westinghouse transformer-type arc welders, eliminating need for motor-driven or engine driven d.c. welding machines.

Substitution of arc welding for riveting reduced steel tonnage by an amount equal to that required for an additional floor, according to a Westinghouse report. A derrick with a 110-ft. mast and a 100-ft. boom erected the steel frame.

Construction of the hospital is managed by the Stone & Webster Engineering Corp. The John L. Mullen Construction Co. erected the steel, which was supplied by the Bethlehem Steel Corp. Welding operators were qualified by the Pittsburgh Testing Laboratory, in accordance with standard testing procedure recommended by the American Welding Society. The laboratory also supervised inspection and tests of field welds in the steel frame, taking a liberal number of samples for testing. The hospital is Pittsburgh's first arc-welded steel-frame building.



GUY DERRICK, jumped from tier to tier, erects steel in welded hospital frame.

COMBINED DRAGLINE AND BELT CONVEYOR, (above and at left) known as Dragveyor, consists of curved bottom hopper fed by 8-cu.yd. bottomless bucket with earth which is delivered to waiting trucks by 60-in. wide belt conveyor unit 79 ft. long. Outfit loads 16-cu.yd. truck in 75 sec.

New Types of Equipment Place 13,000,000 Cu. Yd. of Earth Fill at

HANSEN DAM

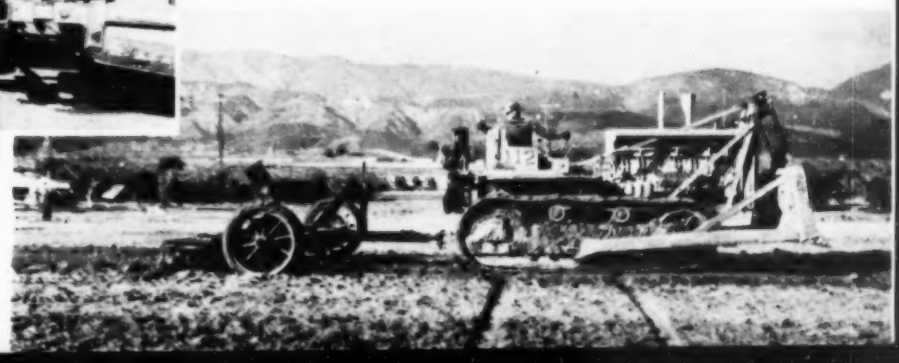
TO SPEED LOADING TIME of 25-cu.yd. Carryall scraper hauled by Tournapull unit, auxiliary tractors are operated both to pull and push the unit, insuring a full load of earth in minimum time. When loaded the scraper is hauled at a speed close to 20 m.p.h. Pulling hook on front tractor engages eye on tractor-scraper, while rear tractor pushes with bulldozer blade.

AT HANSEN DAM, 122 ft. high flood control structure 9,050 ft. long, near Los Angeles, Calif., world's largest dry fill containing 13,000,000 cu.yd., the Guy F. Atkinson Co., contractor, of San Francisco, is operating two new types of earth-moving equipment, illustrated herewith. One, the Dragveyor, a combination of dragline and belt conveyor developed by Garlinghouse Bros., of Los Angeles, is designed to reduce the time of loading 16-cu.yd. trucks. The other, the Tournapull, is a powerful, 160-hp. two-wheeled, pneumatic-tired Le Tourneau diesel tractor, rated to haul a loaded, 25-yd. scraper at speeds of 20 m.p.h.

MULTIPLE-UNIT SHEEPSFOOT ROLLERS (above) are hauled by tractors to consolidate earth fill. Grader blade mounted on front of three-roller hookup levels off high spots.

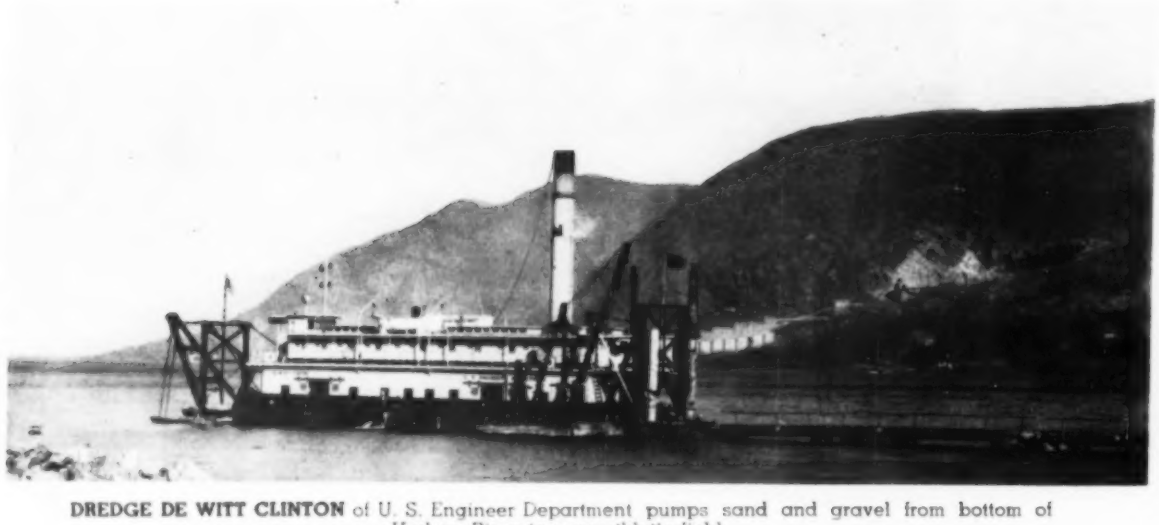
SCARIFIER HAULED BY TRACTOR (below) roughens earth surface to provide bond with next layer of fill.

HUGE PNEUMATIC TIRES carry 30-ton, high-speed Tournapull tractar units, powered by 160-hp., 8-cylinder diesel engines. The tires are 24x32-in. units, 6 ft. 8 in. high, as indicated by comparative height of men standing alongside.



West Point Puts Athletic Field on FILLED LAND

By W. W. SULLIVAN
Office of the Quartermaster, West Point, N. Y.



DREDGE DE WITT CLINTON of U. S. Engineer Department pumps sand and gravel from bottom of Hudson River to new athletic field.

WHEN THE CORPS OF CADETS was expanded by Act of Congress, the War Department was faced with the necessity of increasing the facilities of the U. S. Military Academy at West Point, N. Y. New barracks, a new gymnasium, greater space for academic instruction and larger playing fields for intramural and intercollegiate athletics had to be provided.

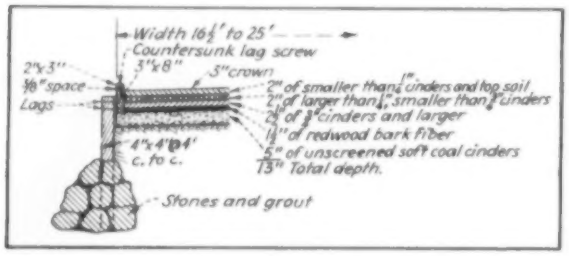
A flat area of approximately 13 acres, known as the North Polo Flats, located in the north section of the post near the Hudson River, was selected as an ideal location for a new athletic field. The only objection was that the elevation of the field subjected it to inundation when spring thaws raised the level of the river.

Hydraulic Fill — Plans were made to raise the level of the field safely above flood water. By arrangement with the U. S. Engineer Department, the services of a dredge were obtained, and about 55,000 cu.yd. of river-bottom sand and gravel was pumped on to the field. In connection with this operation, it was necessary to build a weir and spillway channel at the south end of the field to guide the runoff water through an existing culvert under the railroad tracks into the river. A shore pipe line placed fill material on the field in long windrows, radiating as the spokes of a wheel.

Dry Fill — When dredging operations had exhausted the funds allotted therefor, a WPA project was set up, and the material which had been pumped in was spread to grade by use of a power shovel, trucks, a bulldozer, and three rotary "dig and carry" tractor-drawn scrapers. As there was insufficient material on the site to raise the entire field to grade, a large glacier deposit of sand and gravel, known as Target Hill, located about 1,000 ft. north of the project, was used as a borrow pit, and 20,000 cu.yd. of required additional fill was trucked from the hill. This operation was carried on in two shifts — 16 hr. per day — using a ½-yd. shovel and ten 1½-ton dump trucks.

Topsoil—After subgrade had been established 8 in. below finished grade, a sprinkler system providing connections for 33 self-rotating sprinkler heads was installed. Then, about 12,000 cu.yd. of topsoil was spread over the entire field to a depth of 6 in. and was covered to a depth of 2 in. with sand. At this stage, the entire field was plowed, harrowed, and fine-graded.

As the next operation, the field was fertilized with a mixture of 50 per cent poultry manure, 37½ per cent cotton seed meal, and 12½ per cent ammonia sulphate, spread at the rate of 20 lb. per 1,000 sq. ft. This



SECTION THROUGH TRACK (left) indicates timber curb and 13-in. built-up five-course construction including 1½-in. layer of redwood bark fiber.

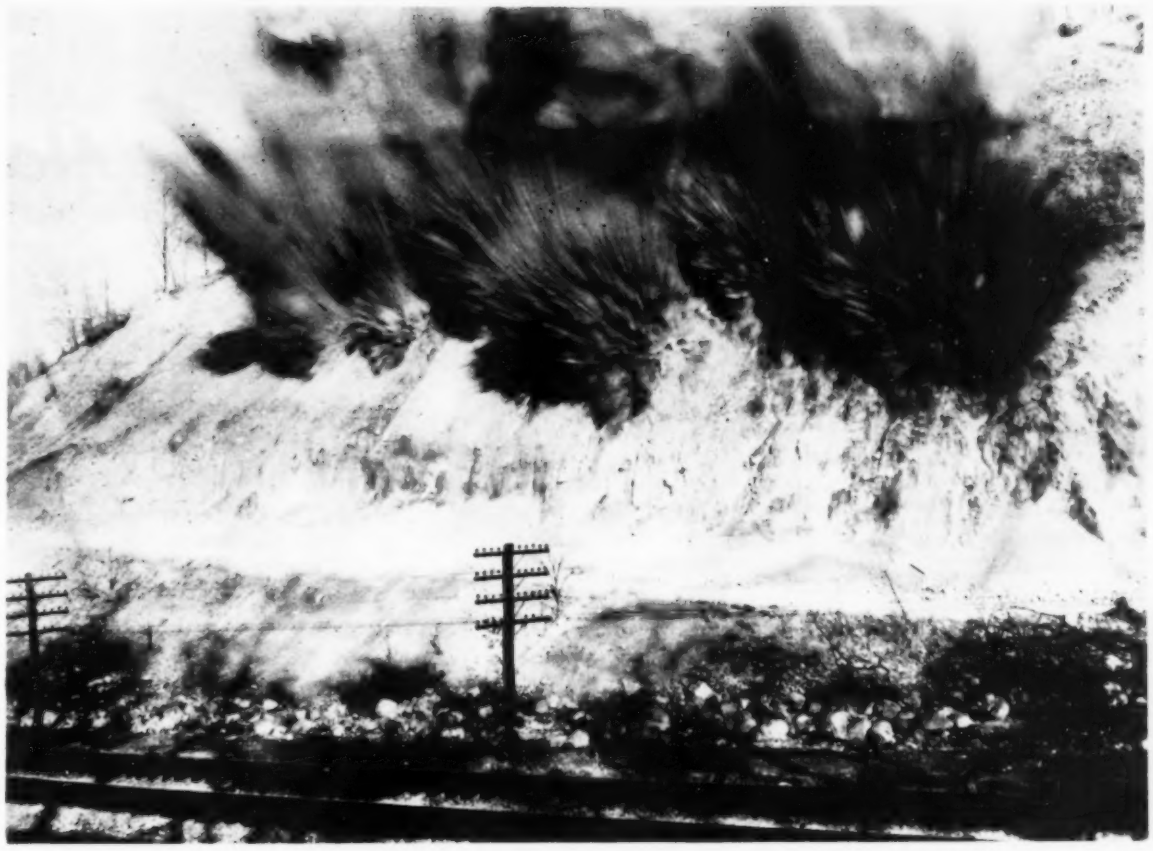
REDWOOD BARK FIBER (left) to improve quality of running track is worked under templet which guides construction of 1½-in. course containing 75 lb. of fiber per 100 sq.ft. Cinder course is placed immediately behind templet to hold fibrous mat in compressed state.

HYDRAULIC FILL (above) to volume of 55,000 cu.yd. flows into site through shore pipe line from suction dredge.

fertilizer was worked into the earth by use of a spike-tooth harrow and timber drag.

Grass Seed — Finally the field was sown at the rate of 6 lb. per 1,000 sq. ft. with grass seed mixed 60 per cent Kentucky Blue Grass, 20 per cent Chewing's Fescue, 5 per cent Colonial Bent, 5 per cent Rye, and 10 per cent Red Top. The seed was worked into the earth by use of a brush harrow, and the surface of the field then was rolled. The entire planted area was lightly sprinkled daily for a period of about three weeks.

An area along the western edge of the field offered the best location for the running track and field event pits, because it placed them near a road and under the lee of a hill, thereby affording protection from the prevailing northwest winds. The track is a 440-yd. oval with semi-circular ends of 120-ft. radius and straight-aways of 280 ft. each. A starting straight-away, extended beyond the circular portions, has a total length of 715 ft. and a width of 25 ft. The remainder of the track is 16½ ft. wide; half of each curve widens on the outer edge to meet the wide straight-away.



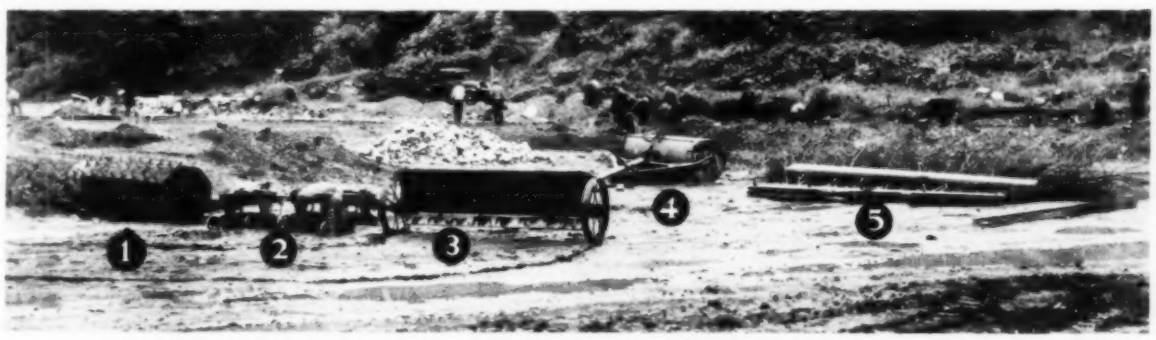
BORROW PIT used to supply 20,000 cu.yd. of additional fill is shaken down by big blast.

Track Curbs — Before actual construction of the track began, the designers communicated with several universities having new tracks, and final plans were based on those used by Leland Stanford University at Palo Alto, Calif. The subgrade, 13 in. below the finished grade of the track, was thoroughly rolled and compacted to the correct grade and contour. Creosoted 3x8-in. Douglas fir curbs, fastened by lag screws to creosoted 4x4-in. posts spaced 4 ft. on centers outside the track area, were placed at the edge of the track with the top of the curbs at finished grade. Pre-fastening the posts to the curb timbers and then setting the complete sections in place proved to be the best method for this installation. On the circular portions of the track, the ends of the curb sections were set first, and the centers of the sections were then sprung to line by the use of crowbars, the posts being blocked into place with stones and concrete.

Course Construction — After the curbs had been set in position, a base course of unscreened soft coal cinders, 5 in. deep after compaction, was placed, using a light roller and exercising great care to assure proper grade. The next course consisted of 1½ in. of redwood bark fiber, placed with the aid of a templet made up of a 2x12-in. plank turned flat and fastened to the edge of a 4x14-in. oak plank, the whole unit being trussed and braced to prevent sagging in the center of the span. The fiber was placed at the rate of 75 lb. per 100 sq. ft. and was tamped lightly under the templet for its full width and length, the templet being moved ahead 10 in. at a time. Immediately after each move, a 2½-in. course of cinders of a size less than ¾ in. was spread over the fiber layer. As soon as sufficient area had been completed, the cinder course was properly shaped and rolled with a light roller. The next course was composed of cinders, larger than ¼ in. and smaller than ¾ in., spread to a compacted depth of 2 in.

Running Surface—Before deciding on the composition of the final layer, or wearing surface, of the track, several experimental sections of surface

(Continued on page 103)



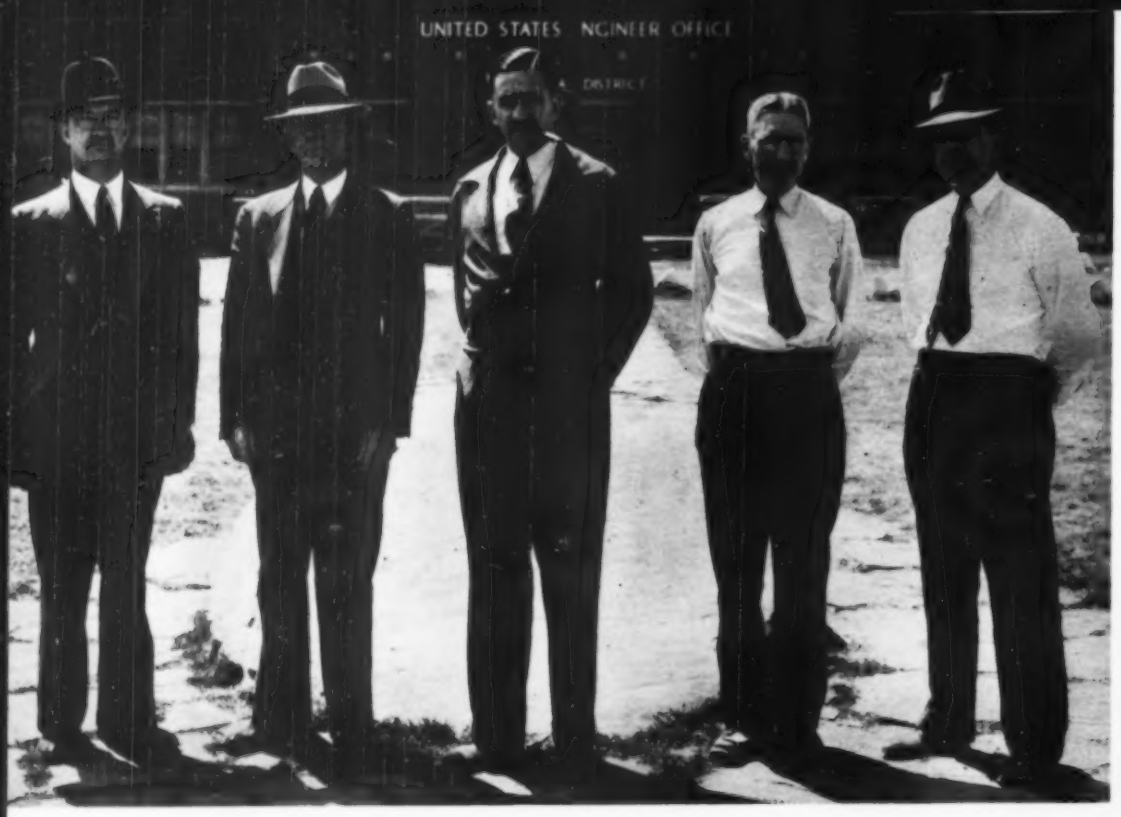
TO PREPARE FIELD FOR SEEDING, builders use: (1) improvised roller of sheepsfoot type made from butt of old flag pole with short pieces of reinforcing rods driven into it; (2) three-section spike harrow; (3) spreader for seed and fertilizer; (4) rotary scraper, 16-cu.ft. capacity, drawn by tractor and controlled by tractor operator; and (5) brush harrow for working seed into topsoil.

ON RAISED GROUND near Hudson River, U. S. Military Academy completes additional athletic field. Infield inside ¼-mi. track contains pits and runways for field events. Tractor-drawn brush harrow, barely visible at right center, is working seed into topsoil, followed by rolling with light wheel-tractor roller in foreground.

Present and Accounted For

A Page of

PERSONALITIES



CONCHAS DAM CONSTRUCTORS line up in front of U. S. Engineer Office at Conchas Dam, N. M. (Left to right) L. F. COLLIGNON, president, McCarthy Improvement Co., contractor for irrigation headworks; H. STANLEY BENT, Sr., project manager for Bent Bros., Inc., and Griffith Co., contractors for main dam and irrigation-headworks operating equipment; Captain HANS KRAMER, district engineer; H. V. PITTMAN, principal engineer, district construction chief in charge of government-hired-labor construction of south dike; and ERNEST W. EVERLY, contractor for emergency spillway.

KANSAS HIGHWAY DEPARTMENT now operates under direction of R. B. MILLS, recently appointed chief engineer after 19 years service in successive positions as district engineer, engineer of highway planning and engineer of construction for same department.

KEY MEN ON CONSTRUCTION of Palos Verdes reservoir **(right)** in distribution system of Metropolitan Water District of Southern California are MAGNUS HJALMARSON (left), superintendent, and WES IRWIN, engineer, for W. E. Hall Co., contractor, of Phoenix, Ariz. Both are Colorado River aqueduct veterans, having been previously employed by Metropolitan Water District.

1939 MARSTON AWARD at Iowa State College goes to THOMAS H. MACDONALD, commissioner of public roads. Annual award is made to Iowa State graduate in recognition of engineering achievement.

FUTURE RAILROAD RELOCATION around Shasta dam is inspected by construction group **(below)**, here standing in front of tunnel portal: (left to right) R. S. CALLAND; WALKER R. YOUNG, supervising engineer, Bureau of Reclamation, Central Valley project; RALPH LOWRY, construction engineer, Kennett Division; J. P. DENSMORE; and D. A. RANKIN, vice-president, West Construction Co., contractor.

MODERN
AS THE NEWEST OCEAN LINER

Climb into the operator's seat of this machine...in the few minutes it takes to get the "feel" of its control levers you will also realize that at last excavators are really out of the "Model T" era.

Here is the means of producing yardage records you've never chalked-up before...year around performance that you can't get without Mevac Power Control...precision of motion and ease of control that make operators say, "I'll take this one"...and "Watch the dirt fly today!"

You get "Mevac" Metered Vacuum Power Control only on Buckeye Clippers. Remember, they also have non-clogging, self-cleaning crawlers.

Fill in and send the request slip for complete data today.

Buckeye Clipper

FULL REVOLVING CONVERTIBLE EXCAVATORS

PATENTED AND MANUFACTURED BY

THE BUCKEYE TRACTION DITCHER COMPANY

SHOVEL DIVISION • FINDLAY, OHIO

Send at once complete information and prices on . . .

☐ SHOVEL ☐ TRENCH HOE ☐ CRANE ☐ CLAMSHELL ☐ DRAGLINE ☐ PILE DRIVER ☐ 1/2 Yd. ☐ 5/8 Yd. ☐ 3/4 Yd.
☐ DITCHERS ☐ BACKFILLERS ☐ HIGHWAY WIDENERS ☐ R-B FINEGRADERS ☐ SURFACE MATERIAL SPREADERS

NAME_____ ADDRESS_____

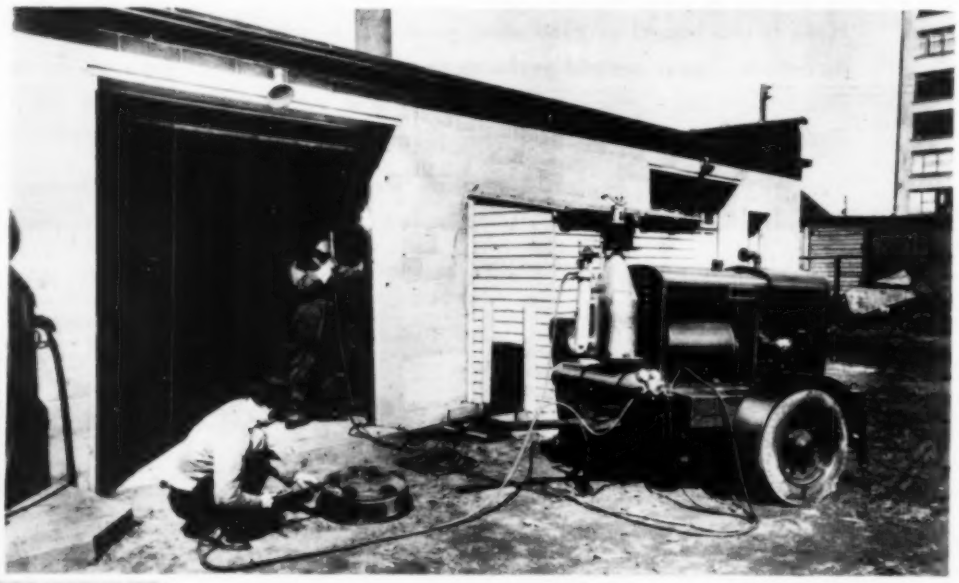
CITY_____ STATE_____

EARTH HANDLING AND ROAD BUILDING EQUIPMENT FOR OVER 40 YEARS

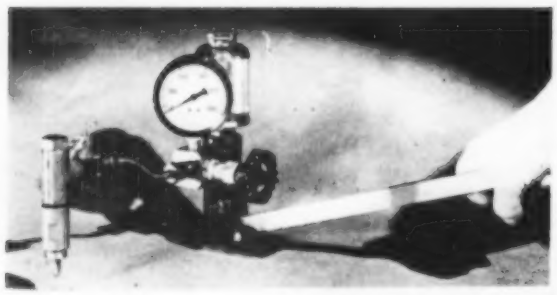
CONSTRUCTION EQUIPMENT NEWS

Review of Construction Machinery and Materials for AUGUST 1939

COMBINATION GAS AND ELECTRIC PORTABLE WELDER (right), for all ordinary work, combines P&H-Hansen 150-amp. unit with gas equipment manufactured by Young Sales Co. Inc., and thus doubles service to be obtained from one machine. Used in connection with this unit, which is coupled with Wisconsin air-cooled motor mounted on standard P & H. trailer, is complete gas welding and cutting equipment. Sight feed acetylene generator is used to furnish acetylene, and special bracket is arranged to carry either small or large tank of oxygen. — **Harnischfeger Corp., Milwaukee, Wis.**

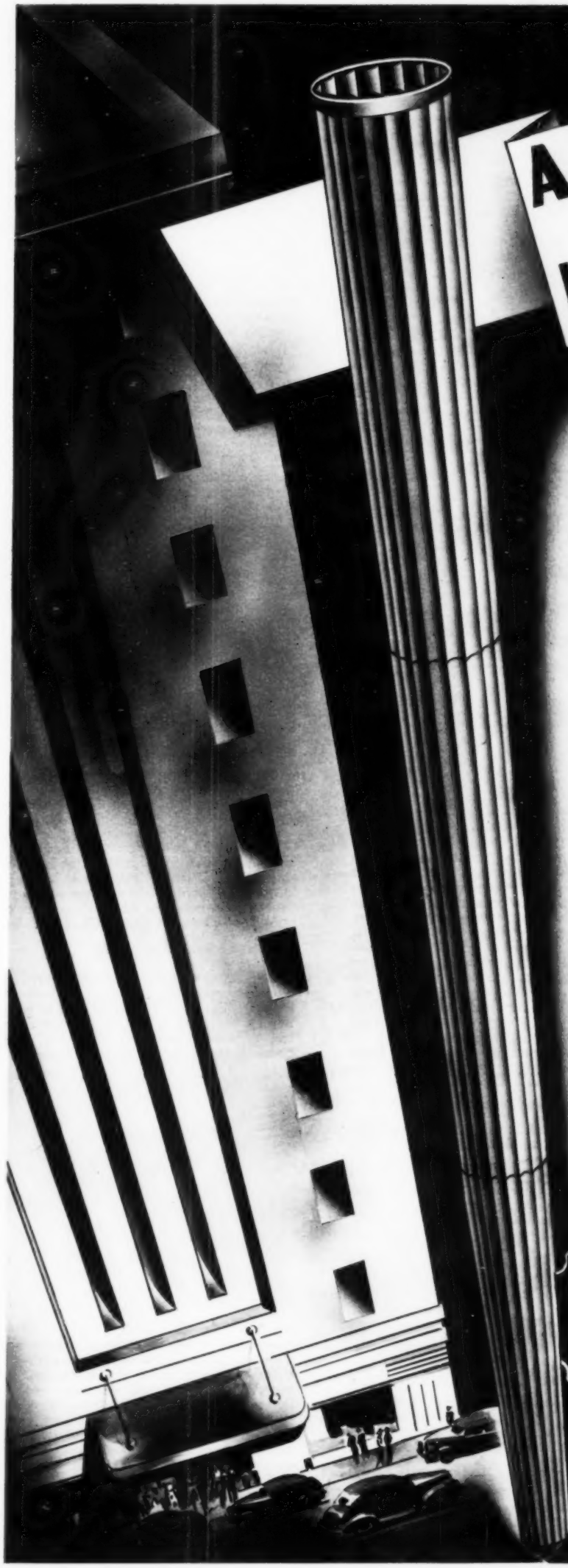


COMBINATION SHOVEL, DRAGLINE AND CRANE (left) in 1 — 1¼-yd. class, is available in two models: one with 20-ft. boom, 16-ft. stick, 1-cu.yd. dipper, 100-hp. gasoline motor and 11 ft. 10-in. crawlers; other with 21-ft. boom, 16-ft. stick, 1¼-cu.yd. dipper, 120-hp. gasoline motor and 12 ft. 3-in. crawlers. Diesel power may be had if wanted. Features: Unit cast steel construction; "Servo" control of drum shaft clutches, vacuum control of swing and travel clutches, safety fuel tank, high pressure lubrication, silent chain power transmission; special steels for shafts, propelling gears, crowding racks, dipper lip and teeth, and clutch housings. Special feature, bolting-on of clutch and brake housings on drum shaft. All-steel box-girder-type shovel booms and handle, electrically welded. Boom point sheaves, 3 in. in diameter. Dipper has renewable lip and reversible teeth. Continuous tread crawler tracks propelled by two-roller-type drive chains. New style cab provides comfort and greater vision for operator. — **The Osgood Co., Marion, Ohio.**



FOR TESTING DIESEL FUEL INJECTORS, portable hand pump enables user to check all sizes of standard makes. With unit mechanic can measure opening pressure and determine correct adjustment; can tell whether spray pattern is uniform and can detect many other irregularities, such as stuck needle valves or dribble or leakage around valve seats. Tests can be made without removing injectors from engine block, thus obviating danger of damaging tips. Height, 9 in.; weight, 6 lb.; detachable handle weight, 2 lb. Small enough to fit in service kit or tool box. — **Diesel Equipment Corp., 4401 N. Ravenswood Ave., Chicago, Ill.**

OXY-ACETYLENE DESCALING APPARATUS (right) said to remove scale and similar accumulations from iron and steel by rapidly heating such deposits with multi-flame tips, thus causing cracking off of scale as result of differential expansion between scale and base metal. Said to remove scale from ingots, billets and slabs to expose seams and defects for inspection prior to chipping and steel castings after annealing. Where necessary, apparatus is mounted on wheeled carriages for ease in travel across steel surfaces. Apparatus also provides ideal paint base by driving out occluded moisture from within and beneath surface scale with rapid heat from high temperature flame. When surface is wire-brushed, painting is carried out before recondensation of moisture occurs. — **Air Reduction Sales Co., Lincoln Bldg., 42nd St. opposite Grand Central, New York City.**



A 10-STORY PILE IN ONE INTEGRAL PIECE

• Union Metal Monotubes of unusual lengths to meet unusual foundation conditions were promptly furnished and successfully driven* recently where piles of 120- and 126-foot lengths were required.

There is a sturdy Monotube available to meet your unusual problems.

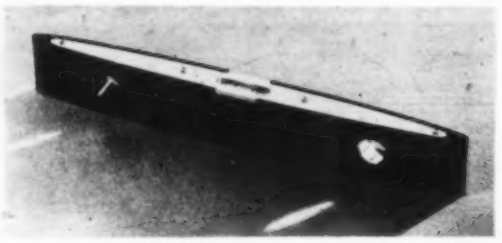
Add to this such other features as assured results, ease of handling, earlier completion of foundations, and you have the answer why an ever-increasing number of progressive engineers are specifying Union Metal Monotubes.

For complete data on this superior pile, write for Catalog No. 68.

* *North Beach Airport, N. Y.*

UNION METAL

THE UNION METAL MANUFACTURING CO.
Canton, Ohio



STREAMLINED TORPEDO LEVEL has body of molded plastic chosen because of its resistance to wear and abrasion and to heat, oil, grease and water encountered on jobs where it is used. Light weight, permanence of form and color luster were other factors taken into consideration in selecting this material. — **Bakelite Corp., 247 Park Ave., New York City.**

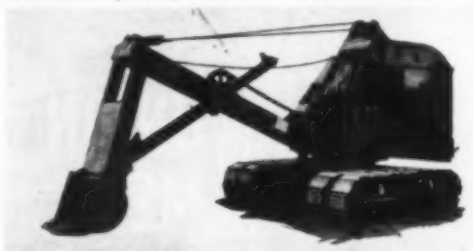
• • •

BUDA HYDRAULIC DIESEL NOZZLE TESTER, a precision instrument for testing accurately full injection nozzles manufactured by Bosch, Timken, Deco and others, eliminates necessity of paying for having nozzles adjusted or cleaned. Height, 10¾ in. Weight, 12 lb. May be permanently fastened to any work

bench. To facilitate easy handling, specially designed carrying case is provided. Features: (1) Diesel oil reservoir — ample capacity for testing 20 to 25 nozzles; (2) two-way thread on connection for nozzles assures air-tight connection; (3) two adapters for specific type nozzles: one for 1,600-lb. pressure per square inch and one for 1,800 to 2,000 lb. per square inch; (4) accurate gage — pressures calibrated up to 3,500 lb. per square inch; (5) Walworth two-way relief valve, protecting gage needle from damage and assuring accurate nozzle adjustment; (6) one-piece body construction built for extreme pressures — said to be leak-proof; (7) convenient socket for hand lever bar; (9) holes drilled in base for fastening to work bench or other mounting. — **The Buda Co., Harvey, Ill.**

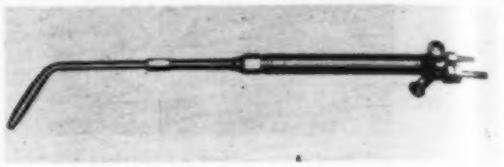
• • •

FRONT-DUMPING SHOVEL is particularly suited for land clearing; for digging out trees, stumps and boulders; for clearing and building of ditches; for ripping up and hauling away old concrete and macadam paving, and for loading peat moss.



Consists of patented shovel attachment developed for use with Speeder or Link-Belt convertible machines to handle material that will not pass advantageously through bucket, and for subgrade operations where skimmer ordinarily might be used. Uses powerful chain crowd with double leverage on cutting edge, producing action somewhat like that of trench hoe, but in reverse. Since there is no hoist line running down to top of bucket, machine can work in places where other shovels might foul. — **Speeder Machinery Co., 1201 Sixth St., S., Cedar Rapids, Iowa.**

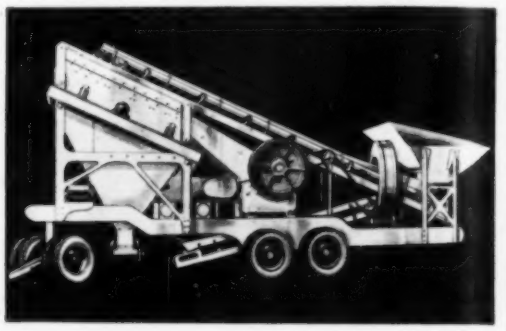
HEAVY-DUTY BLOWPIPE for welding and heating ranges above those which can be handled by ordinary blowpipes is said to deliver tremendous amount of heat in localized area so quickly that metal working and heat treating can be accom-



plished at top speed. Especially useful in such operations as forging, forming, straightening, bending and pressing. Extensions for welding head are available for extra heavy work, doing away with need for heat shields. Operator can work in comfort, away from source of heat, blowpipe, even with extension, being easy to handle. Applications: fabrication of tanks and pressure vessels; wrinkle-bending large diameter pipe. Can also be used for lighter work as well as for flame bending jobs. **—The Linde Air Products Co., 205 E. 42nd St., New York City.**

• • •

DUAL PORTABLE CRUSHING PLANT in which belt conveyor return system for feeding back material from both primary jaw crusher and secondary crushing rolls has been replaced by new turbine-type revolving elevator called Rotovator which conveys material discharged into it by under crusher



return conveyor to screen feed conveyor directly above it. Use of Rotovator results in saving in weight, in overall length and width of machine, thus providing far lighter, more portable unit, shortening crushing cycle and speeding up production. Other equipment of plant includes: 2½-deck 3x8-ft. screen; hopper and grizzly; feeder; sand ejector; streamlined 10x36-in. lightweight crusher and 30x18-in. rolls. Of welded construction and equipped with twelve low pressure tires. Only one operator required.—**Universal Crusher Co., Cedar Rapids, Iowa.**

• • •

PNEUMATIC-TIRE WHEELBARROW, said to run easier, to carry more and larger loads, to stand up longer under heavier service and to be non-destructive, is equipped with 4.00x8-in. 2-ply tire and tube, but 4- or 6-ply tires are available, if desired. Ball bearings used are complete assembly with hard-

ened steel races capable of taking end thrust as well as radial load. All wear comes within this assembly as it does not rotate on axle. Wheelbarrows may be had in three wood-frame and three pipe-frame models with fifteen trays to fit frames. Features: (1) Double tray bottom permits placing tray forward further on wheel, resulting in better wheeling balance; (2) curved leg brace eliminates danger of bumping legs on board rest and adds to comfort of walking with load; (3) 85 per cent of load is placed on wheel, lessening fatigue of operator; (4) all parts interchangeable. **— Red Star Products, Inc., 12910 Taft Ave., Cleveland, Ohio.**

(Continued on page 80)

GMC *Announces* NEW 10-12-15 TON DUMP MODELS built to withstand the stress and strain of crushing dump loads in pit and quarry service, GMC offers three *all-new* models (one illustrated below)—tougher, more powerful than others! *Prices low.*

HERE'S POWER *that only GMC can give!*

THE TRUCK OF VALUE GMC

General Motors Trucks pull out of deep pits and up steep grades easier than other trucks regardless of cost or make! They have *more power* with which to get rolling. In short, GMC SUPER-DUTY valve-in-head engines outpull *all other* truck engines. GMCs drive easier in *every* way, with FRICTION-FREE ball-bearing steering on medium and heavy-duty models and the exclusive SYNCRO-MESH transmission! Finally, GMCs save more on gas—as much as **40% more**, owners report!

CHECK GMC DIESELS *for lower operating and maintenance costs. GMC is the only Diesel truck with effective engine braking on long downgrades—has greater lugging power for engine size —and is the only Diesel that measures, injects and atomizes the fuel directly at each cylinder.*

Our own YMAC Time Payment Plan assures you of lowest available rates

CHECK GMC PRICES Against the 3 Lowest!

GMC TRUCKS TRAILERS - DIESELS

What do readers get out of CONSTRUCTION Methods & Equipment

Personally reported to a member of the McGraw-Hill editorial research staff

In common with other McGraw-Hill publications, *Construction Methods and Equipment* has established a continuing program of editorial research which is conducted by a staff of specially trained inquirers. The members of this staff make personal calls on subscribers at work in the field and in their offices in all sections of the country — to question them as to their appraisal of *Construction Methods and Equipment*, how they use it, what they like best, what they pass up. On each visit a specific issue is gone through cover to cover and every page and every item weighted according to its value to the interviewed subscriber. An original and far-sighted step in journalistic practice, the object of the plan is to help the editors gage the needs of subscribers so that a progressively better publishing service may be provided. These research visits in no way replace the vast field contacts of *Construction Methods and Equipment*'s editors but augment them and draw out frank expressions that readers sometimes are reluctant to give to the editors themselves.

Believing that readers will benefit from a knowledge of what their colleagues find of value in *Construction Methods and Equipment*, we are publishing a series of advertisements in each of which we quote interviewed subscribers.

Chief Engineer of an underground transportation system:

In *Construction Methods and Equipment* I always turn first to current jobs and who is doing them. I look over the "How of it" and then proceed through the publication page by page. Before reading any articles I get an idea first of what the issue contains.

In a field as broad as construction there is much to keep in touch with and to do this without the aid of pictures and briefly condensed articles would take weeks on end. I don't know how you could possibly improve this magazine. Frankly, I think it is okay as is and you can quote me as being well satisfied.

Superintendent of construction for a general contractor in Ohio:

I am particularly interested in looking for new equipment or methods which I can apply in my own work. That is why I like *Construction Methods and Equipment.*

I look at the advertisements closely. Just recently I bought two Novo pumps after seeing them advertised in this magazine. Your idea of using pictures more than text is mighty fine. They are quick and easy to understand.

FOUR STEEL BRIDGES

Take Beauty Awards

(Continued from page 39)

MIDDLE FORK OF FLATHEAD RIVER BRIDGE. Belton, Mont., receives award in Class C, costing less than $250,000. Total cost $74,815. Continuous deck truss bridge with spans of 85, 168 and 84 ft. Designed by Montana Highway Department, B. J. Ornburn, bridge design engineer; steel fabricated by Pittsburgh-Des Moines Steel Co.

Mich., and Sarnia, Ont., a through-truss curved chord cantilever with a main span 871 ft. long.

Among structures in Class B, costing $250,000 to $1,000,000, first place was awarded to the Capital bridge, Frankfort, Ky., illustrated and described herewith. Honorable mention went to the Chain bridge, over the Potomac River between the District of Columbia and Virginia, a long continuous deck girder structure.

In Class C, bridges costing less than $250,000, the jury awarded first place to a Montana bridge across the Middle Fork of the Flathead River, as noted with an accompanying photograph. Honorable mention was received by two bridges in this class: the 384-ft.-span steel rib arch of the Thousand Islands bridge across the St. Lawrence River between New York State and Ontario and the Burnham Park pedestrian bridge at the foot of E. 47th St., Chicago, a 115-ft.-span welded rib arch.

First place in a fourth class, movable bridges, was awarded to the Lafayette Ave. bridge, Bay City, Mich., depicted by an accompanying illustration.

Members of the jury making the awards for 1938 were Graham Erskine, representing Arthur L. Harmon, of Shreve, Lamb & Harmon, architects; J. Andre Fouilhoux, architect; David L. Snader, department of civil engineering, Stevens Institute of Technology; Kenneth Hayes Miller, artist; and F. E. Schmitt, editor, Engineering News-Record.

SEAM TESTING DEVICE

Locates Leaks in Tank Bottoms and Decks

A NEWLY DEVELOPED seam testing service has just been inaugurated by the American Pipe & Steel Corporation, of Alhambra, Calif. It is a vacuum method that can be adapted to locating leaks in the bottoms and decks of tanks; ship decks and hulls, and pipe lines. This method is said to involve a minimum of time and expense.

The patented device used in these tests consists of an air-tight, rectangular-shaped box, equipped with a vacuum gage. The top of the box is covered with glass, and soft rubber strips are mounted around the base.

When tests are to be made, a section of the seam is covered with a thick solution of soap suds. The device is placed over the covered area, and a strong vacuum is created by means of a suction pump. The tremendous suction compresses the soft rubber base of the device so that air is sealed out. Any imperfections in the seam within the area covered by the tester will permit the inflow of air, which in turn, will cause large clusters of soap bubbles to appear at that particular point. Detected through the glass top of the seam tester, these bubbles instantly indicate the presence of a leak. Inspection of any tank can be made in from one to two hours, or while alternating service.

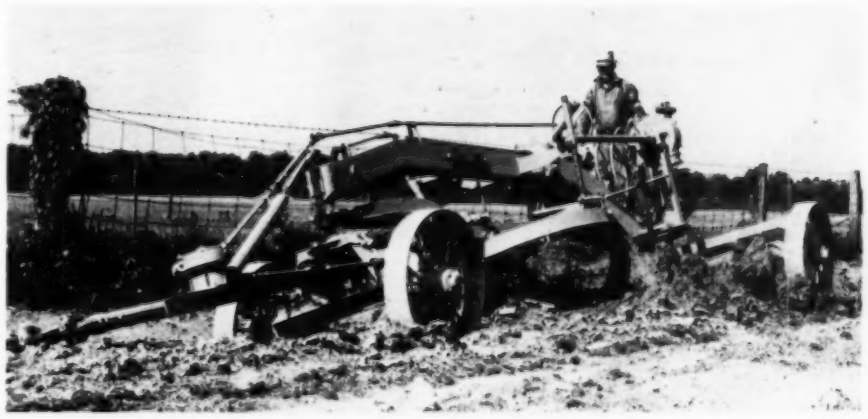
BLADE DEEP IN WORK

Galion graders, motor patrol and pull type alike, have that extra margin of strength, flexibility and dependability which gives them the ability to do the job right and to lower highway costs.

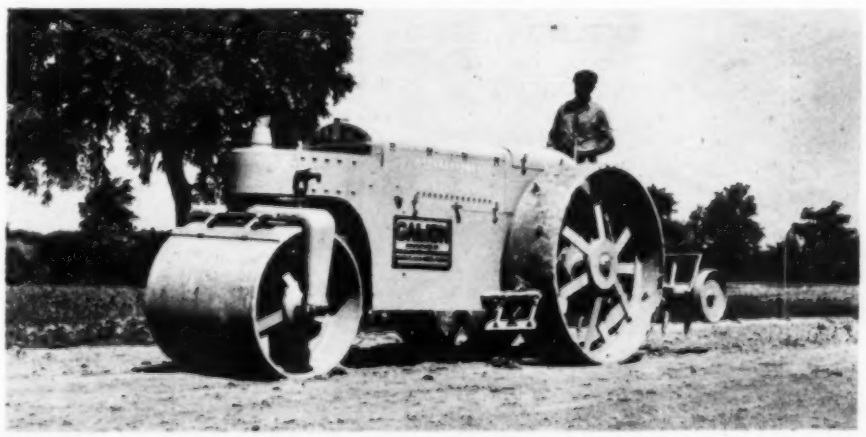
In new construction work and heavy maintenance, the HEAVY DUTY motor patrol (illustrated above) is fast making a name for itself. It is most modern and versatile with many new features to make it the outstanding motor patrol on the market today. Let us send you literature describing this new unit and what it will do.

The Galion No. 210 pull grader (right) is also shown knee-deep in grading work. Like the heavy duty motor patrol, this unit is new and more flexible than ever before. Both units have a wider range and speed of blade adjustments for shoulder, high bank and vertical angle cuts. Bulletin No. 234 covers the No. 210 pull grader.

Write today for complete data.



At the top of page is shown the Galion heavy duty motor patrol. Next above is the No. 210 leaning wheel grader with manual control. Below may be seen a Galion Chief 3-wheel roller with spoke wheels and scarifier attachment.



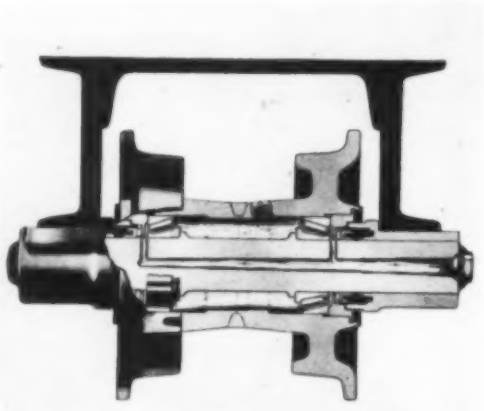
THE GALION IRON WORKS & MFG. CO.

***Main Office and Works:* Galion, Ohio** ***Export Division:* Columbus, Ohio**

CONSTRUCTION EQUIPMENT NEWS

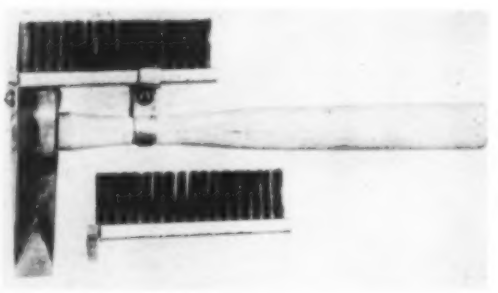
Continued

POSITIVE-SEAL TRUCK WHEEL ASSEMBLY for tractors, said to eliminate roller greasing every 8 hr. has instead of ordinary bearings, tapered roller bearings with positive seal arrangement which prevents lubricating oil from getting out and dirt, dust,



mud and grit from entering. Lubrication, according to manufacturers, is necessary only once every 200 operating hours. Assembly is so constructed that all old oil is forced out after each lubrication, thus affording double protection against abrasive grit working into track assembly. Said to prolong track life, to lower lubrication costs 80 to 90 per cent, and to increase tractor operating time by eliminating usual greasing periods. — **Allis-Chalmers Mfg. Co., Milwaukee, Wis.**

COMBINATION CHIPPING HAMMER AND WIRE BRUSH for welders consists of drop forged steel hammer with hardwood handle with heavy-duty wire brush rigidly mounted on top side. Hammer

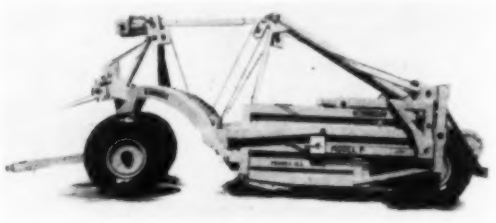


chisel chips and breaks scale, then tool is turned in hand and brush is used to clean surface. Brush held in place by stout bolts which may be loosened to reverse brush and thus get full wear from it or to renew it when necessary. Chipper designed especially for quick and thorough removal of slags formed on top of weld metal when heavily coated electrodes are used, but said to be equally useful for removing rust and scale to provide clean, bright surface for welding. — **St. Pierre Chain Corp., 54 Frank St., Worcester, Mass.**

RIVET-BOLTS may be used in place of hot driven rivets in erection of steel frame buildings, bridges and towers at saving of 45 per cent of cost, according to manufacturers. On two similar jobs, they report, cost per hot-driven rivet was approximated at 45c., whereas cost per rivet-bolt was 25c. each. Application said to be simple, requiring only maul and wrench.—**Dardelet Threadlock Corp., 55 Liberty St., New York City.**

CONSTRUCTION CEMENTS FOR CALKING and glazing, for cementing rubber, wood and composition tiles and sheet floor covering to concrete and metal floors, is said to have strong tack and initial bond and to be waterproof to fresh and alkaline water. Bostik cement available in following types: (1) For flooring, wall covering, damp-proofing direct and with sheet copper; (2) glazing; mirror backing; glass and other materials to glass; (3) calking cement, gun or trowel application; (4) white cement for metal; glass; other materials to glass; (5) sealing coat against damp. — **B. B. Chemical Co., Cambridge, Mass.**

SINGLE BUCKET SCRAPER. 11-yd. struck capacity and with 8 ft. 6-in. cutting blade, has following features: light weight for capacity, new tail-gate sheave arrangement, higher sides to retain full load, and stronger yoke. Although it is said to move 15 yd. heaped measure per trip, scraper weighs only from 18,200 to 18,600 lb. (depending upon tire

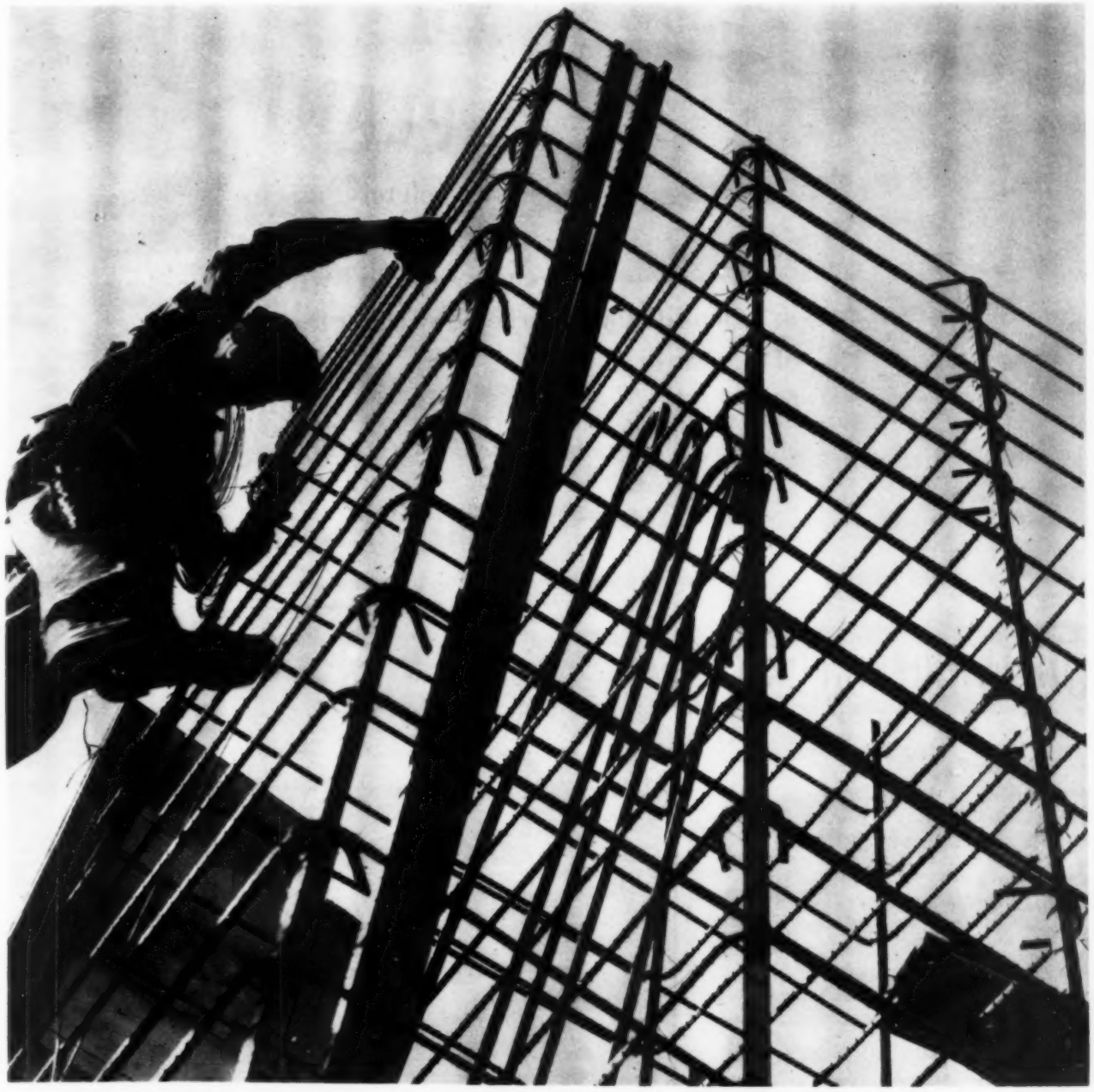


equipment), thus providing high ratio of load to scraper weight. To keep them free from dirt, sand and gravel, tail-gate sheaves are placed on sides instead of on top of bowl, thus providing more efficient control from center of load. Positive ejector tail gate, cable controlled, gives regulated dumping in any required thickness, and fractional inch control of cutting blade said to result in greater margin of scraper usefulness. Extra high sides of scraper bowl prevent waste of loaded material. Drawbar hitch on rear can be used either as pusher block or hitch for tandem scraper operation. — **R. G. Le Tourneau, Inc., Peoria, Ill.**

PORTABLE FLOODLIGHT. 250-watt, for temporary or emergency illumination, is equipped with galvanized steel trunnion bracket with 12-in. circular base and 10 ft. of rubber jacketed cord with plug

and carrying handle. Polished Alzak-processed aluminum reflector is inserted in cast aluminum housing with glass door available in plain, lightly stippled, heavily stippled and spreadlight types. Weight, 20 lb. — **General Electric Co., Schenectady, N. Y.**

Speed that backbone of steel with Bethlehem Reinforcing Bars



RAPID ERECTION is made easy with uniform high-strength Bethlehem Reinforcing Bars, cut and bent to specifications, delivered at the site promptly.

Specifying Bethlehem Reinforcing Bars goes a long way toward eliminating the possibility of having to pay costly penalties and toward speeding the completion of the contract. Reasons:

Made to do the job — Bethlehem Reinforcing Bars are rolled of high-grade steel. They are dependable, uniform, supplied in shapes and sizes to meet your requirements.

Ready when you need them — Bethlehem Reinforcing Bars are stocked in warehouses conveniently near you in miles and minutes. By rail, water or truck, these bars will reach you promptly no matter how large your contracts or where your construction site.

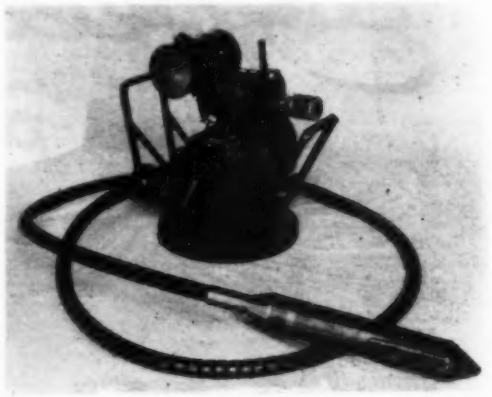
Before you start your next contract, get in touch with the Bethlehem office or warehouse nearest you. It's a wise move that will help you save time and money on the job.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY, General Offices: Bethlehem, Pa. Warehouses: Atlanta, Baltimore, Boston, Buffalo, Chicago, Danville, Detroit, Johnstown, Pa., Los Angeles, New York, Philadelphia, Pittsburgh, St. Paul, San Francisco, Seattle.

BETHLEHEM STEEL COMPANY

CONCRETE VIBRATOR equipped with 3-hp. Wisconsin gasoline engine with outside magneto, impulse coupling and Twin disk clutch mounted on free swiveling base. Engine operates at 2,600 r.p.m. and turns flexible drive shaft through 2:1 speed increase V-belt with ball bearing counter



shaft, feature which permits running engine at normal speed with increased speed for vibrator. Vibrator itself consists of off-center rotor mounted on double-ball bearings, incased in abrasion resisting steel tube with welded manganeses steel ribs. Flexible drive consists of piano wire welded core incased in molded rubber tube with internal steel bearings. Rubber housing furnished either with or without spiral armor. Feature: full interchangeability of 7- or 12-ft. long driving sections and of vibrator heads. For use in narrow forms vibrator 1⅝ in. in diameter and 17 in. long is used. For ordinary mass vibration either 2⅜x21-in. or 3x21-in. machine is used. Vibrator 3½-in. size is available for easy jobs, usually attached to 4-hp. engine.—**White Mfg. Co., Elkhart, Ind.**

LIGHT-WEIGHT FLOOR SANDER made especially for use of maintenance men and for rental market is powered by 1-hp. motor which operates on 25- to 60-cycle, a.c. or d.c. current and which is hinge mounted to provide belt tension and high efficiency in power transmission. Motor switch built into motor,

eliminating wiring to handle. Drum, 7-in.-diameter, is dynamically balanced and controlled by lever on handle. Paper mounted by new quick action cam. High speed vacuum fan said to increase efficiency of dust collecting system. Bag mounted on pipe that swivels — can be pushed from one side to other without stopping operation. With machine, 35 ft. of heavy 14-gage rubber covered cable is furnished. — **Porter Cable Machine Co., Syracuse, N. Y.**

HARD SURFACING POWDER for application with carbon arc called "Surfaceweld A", is said to give smooth, dense, hard abrasion resistant surface. Can be applied in very thin layer, if desired. This alloy maintains hardness and resists scaling at high temperatures, according to its manufacturer. Shipped in 1- and 15-lb. cans. — **Lincoln Electric Co., 12818 Coit Road, Cleveland, Ohio.**

HOT MONEY

YESTERDAY *one thief* stole more dollars from American Industry than *all* the "stick-up" men took from the public.

This industrial thief is FRICTION. His "hot money" is *your* money—represented in wasted power, rapid wear, costly delays and repairs.

To catch money-stealing Friction red-handed is the job of a group of scientists, engineers and technicians as skilled in their own art as are the "G-Men."

And these "friction-catchers" are at your service instantly, anywhere in America.

Shell keeps a force of them always ready. They are armed with friction-killing lubricants of numerous types and grades. And these Shell specialists have an enviable record for their *arrests* of friction. Thousands of big and little cases on big and little machines crowd their case-history files.

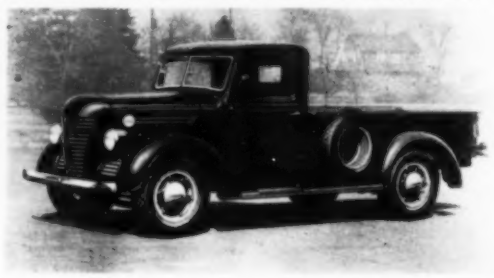
Call in the Shell lubrication man today. There is no charge for his help and no obligation to you.

SHELL

SHELL INDUSTRIAL LUBRICANTS

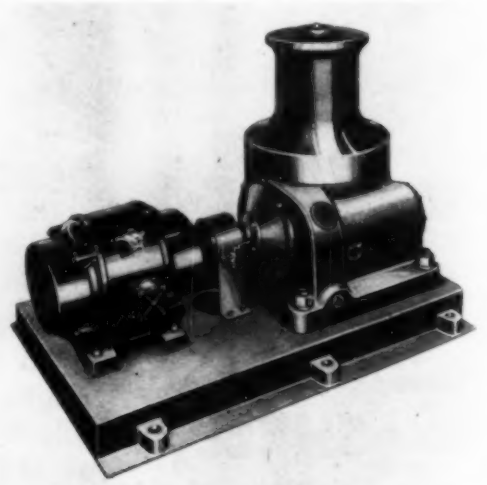
1½-CU.YD. EXCAVATOR for street and roadbuilding, grade eliminations, railroad work, conservancy developments and construction projects of all types. Said to be sturdily constructed to meet severest of digging requirements and well proportioned and properly balanced to provide maximum stability regardless of travel or operating conditions. Photo shows excavator equipped as dragline.—**The Marion Steam Shovel Co., Marion, Ohio.**

LIGHT-DUTY TRUCKS ¾-ton capacity in two models, with 4- or 6-cylinder engines, have been added to line of Federal trucks to cover all trucking requirements. To meet demand of users who wish 4-cylinder operating and upkeep economy, Model 7

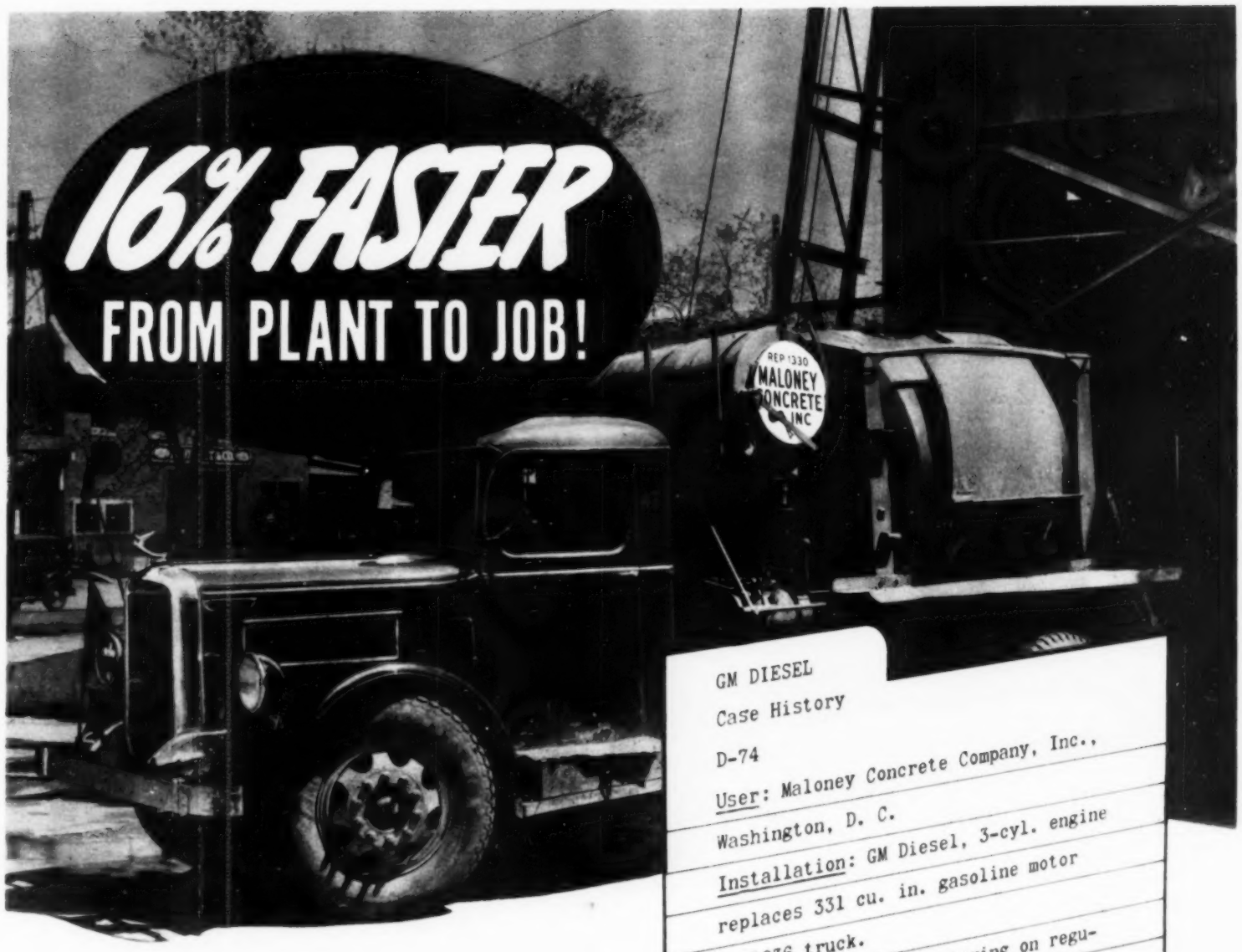


is equipped with engine of that type with bore and stroke of $3^{3}/_{16}$ x $4^{3}/_{8}$ in. which develops 52 hp. For operators who desire 6-cylinder performance and power Model 8 is equipped with 6-cylinder 7-bearing engine with $3^{1}/_{4}$ x $4^{1}/_{8}$-in. bore and stroke, developing 65 hp. Built in four wheelbase lengths, 102, 111, 119 and 128 in.—**Federal Motor Truck Co., Detroit, Mich.**

VERTICAL-CAPSTAN ELECTRIC CAR SPOTTER quickly spots railroad cars for loading or unloading. Two models (Nos. 5-A and 10-A) available, one capable of 5,000-lb. rope pull or moving one to three cars and other 10,000-lb. rope pull with capacity to move three to six cars depending on track



conditions, whether level, on grade, straight or curved. Powered by high torque electric motor connected to spotter drive mechanism by incased flexible roller chain coupling and mounted with spotter on welded steel base plate. Vertical capstan made of semi- or cast-steel is machine finished to prolong life of haulage cable. Gearing completely housed. Ratchet and pawl, available if desired, are mounted inside capstan for holding cars on incline when power is off. No. 5-A spotter equipped with 5-hp. motor; No. 10-A with 10-hp. engine.—**Link-Belt Co., 307 N. Michigan Ave., Chicago, Ill.**



GM DIESEL
Case History
D-74

User: Maloney Concrete Company, Inc., Washington, D. C.

Installation: GM Diesel, 3-cyl. engine replaces 331 cu. in. gasoline motor on 1936 truck.

Performance: 16% time saving on regular run, between plant and job.

—this Diesel adds a concrete profit to the savings it makes

ALL concrete is pretty much the same, and today's rock-bottom prices have practically eliminated the cost factor from competition.

That's where fast deliveries come in—get the *re-orders*.

And that's another way the GM Diesel is outperforming engines of previous design—gasoline engines included.

Just watch it highball through sand or mud—take the hills in higher gear—pick up with a snap out of hairpin bends—lug crushing loads through blistering heat with a miser's share of lube oil!

This same tank-like pulling power of the Dean of the Diesels is available for everything on construction jobs—on shovels, cranes, draglines, bulldozers and mixers. It responds to variable loads with a snap and alertness even gasoline engines can't match—yet "hangs on" with the tenacity of a steam engine.

Ruggedly built on the General Motors 2-cycle principle, its operation is simplified beyond need for "expert" operators—its resistance to wear vitally increased.

And all its wearing parts are standardized for instant, low-cost replacement. That completes the picture of Packaged Power, from 15 hp. up, ready to go—and rarin' to go—on all kinds of stationary and portable work.

The GM Diesel dealer near you can show you how, why, when, and where it will fit in on *your* jobs.

Write or wire for his name and address.

GM DIESEL POWER

DIESEL ENGINE DIVISION
General Motors Sales Corporation
Cleveland, Ohio

☆ GENERAL MOTORS DIESEL ☆

SEE THE GENERAL MOTORS DIESEL EXHIBITS AT THE NEW YORK AND SAN FRANCISCO FAIRS

It's "VENTUBE" all the way
ON THIS SCARSDALE TUNNEL JOB

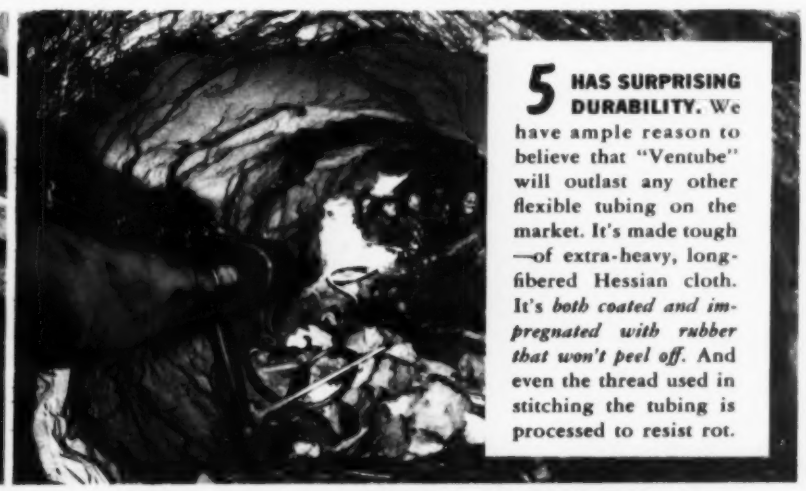
AND HERE'S WHY!

1 REQUIRES LITTLE EQUIPMENT. A small motor-driven fan and adequate lengths of "Ventube" are all you need to blow fresh air into the tunnel, thereby forcing particle-laden air away from the face. No heavy, expensive machinery is required to do an efficient job.

2 DELIVERS 100% BLOWER CAPACITY. A recent test reveals that full blower capacity is delivered through "Ventube."* It goes down shafts straight as a string—hangs up along entries—without kinks or bulges to interfere with the smooth flow of air through the tubing.

3 EASY TO DIRECT FLOW OF AIR. This "Ventube" T-joint makes it possible to direct air in either or both directions. When air is required at only one heading, the opposite end can be shut off with either a damper or by twisting wire around the tubing.

4 AMAZINGLY EASY TO HANDLE. "Ventube" is light-weight. One man can hang an entire system in a couple of hours. When blasting, sections nearest the face slide back quickly and easily. And when the job is finished, you salvage the *entire* system!



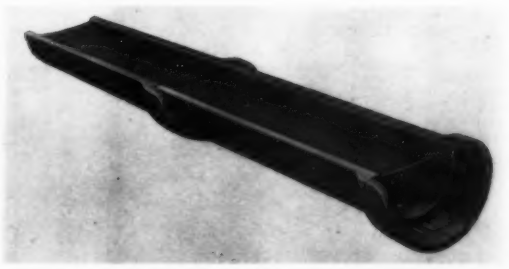
5 HAS SURPRISING DURABILITY. We have ample reason to believe that "Ventube" will outlast any other flexible tubing on the market. It's made tough—of extra-heavy, long-fibered Hessian cloth. It's *both coated and impregnated with rubber that won't peel off.* And even the thread used in stitching the tubing is processed to resist rot.

WHAT DOES THE A. & J. CIANCIULLI CONTRACTING CO. on the Scarsdale, New York, Drainage Tunnel think about "Ventube"? Here's what the superintendent says: "I've used all kinds of ventilating material during my lifetime—and let me tell you . . . it comes in for plenty of inspection on projects of this kind. But never once, have any of the authorities found even the slightest reason to question the air in this tunnel. That's important, not only to us in charge of the work, but to the men down there in the tunnel." We'll be glad to give you facts and figures and furnish estimates covering your jobs. Write du Pont today.

**"Ventube" is du Pont's registered trade mark for its flexible rubberized ventilating duct.*

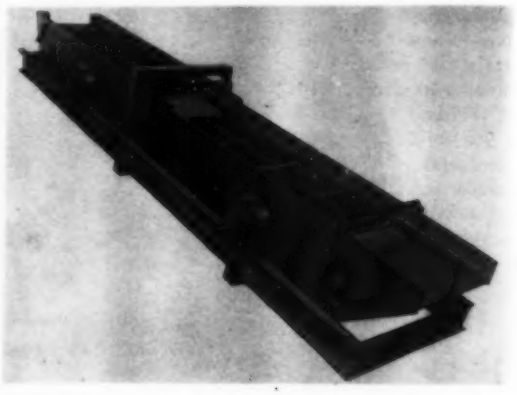
DU PONT VENTUBE
THE FLEXIBLE VENTILATING DUCT

E. I. DU PONT DE NEMOURS & CO., INC.
"FABRIKOID" DIVISION
FAIRFIELD, CONNECTICUT



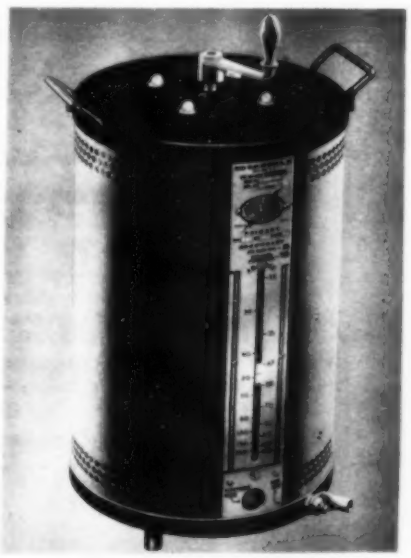
foundations, sewage disposal plants, athletic fields, airports or wherever quick underdrainage is essential to normal operation. — **The Robinson Clay Products Co., Second National Bank Building, Akron, Ohio.**

SCREENING ARRANGEMENT for vibrator duplex crushing plant produces rock chips necessary for seal coat of black top roads as a by-product simultaneously while preparing road gravel. Said to be no waste of material as crusher dust is screened

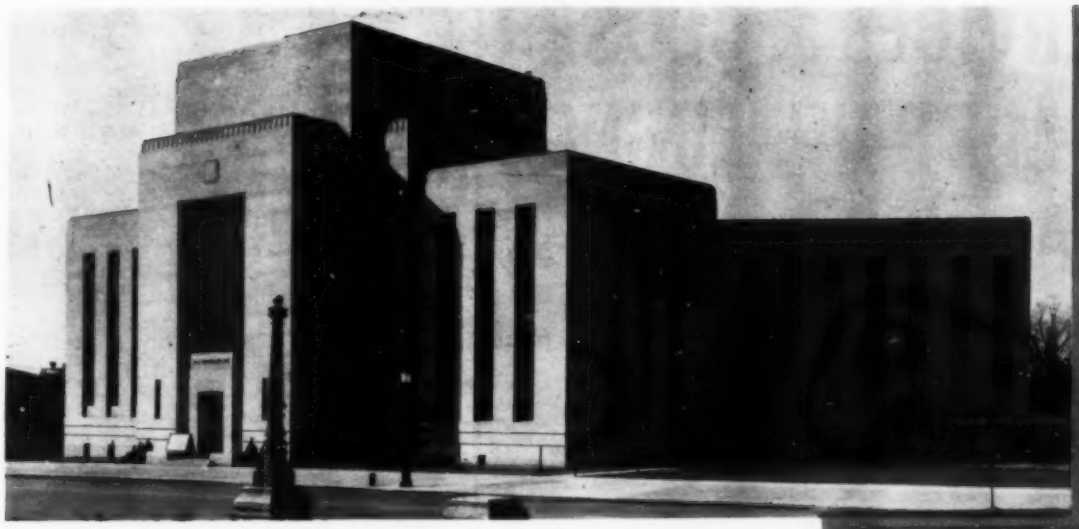


out of chips and mixed with gravel. Crusher uses bottom deck for screening pit material, while top deck screens crushed material. As these materials are not mixed, it is possible to screen crusher chips on top deck where chip spouts deliver them to belt conveyor. Plant thus produces road gravel and rock chips and rejects sand at same time.—**Pioneer Engineering Works, Inc., Minneapolis, Minn.**

LIGHT-DUTY ARC WELDER of 100-amp. rating at 30 v. for light sheet metal welding and other work requiring low current and fine control. Machine is of alternating current, transformer type and employs heavy coated electrodes. Standard wiring is for single phase, 220-v. 60-cycle power supply, but



may be obtained for 440-v. supply, if desired. Open circuit voltage is 65 v. Calibrated scale on front of welder indicates adjustments from 25 to 150 amp. which are made continuously by rotating crank at top without ceasing operations. This type of adjustment makes it possible to tune current exactly to suit thickness and welding characteristics of material being welded and of electrode used. Inclosed in sheet metal housing 16½ in. in diameter, 24 in. high. Weight 145 lb. — **Wilson Welder & Metals Co., Inc., Lincoln Bldg., New York City.**



Left:

NEW YORK

The new Erie County Jail in Buffalo, N. Y., is another beautiful Plyform job. The big Plyform panels served as sheathing and lining combined—gave numerous re-uses.

Below:

WASHINGTON

The recently completed Purdy Bridge across Henderson Bay, Gig Harbor, Wash., is of the cellular type of construction. All forms were made of Plyform, which gave smooth surfaces at very low cost.

Here's why more and more concrete is being poured in forms made of

PLYFORM

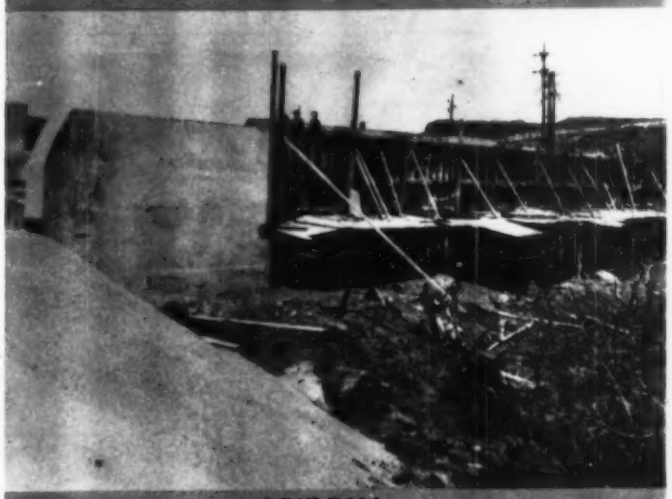
1. Serves as sheathing and lining combined.

2. The satin-smooth surfaces of every Plyform panel are oil-treated at the mill.

3. Plyform panels are edge-sealed in distinctive silver-green and stamped with a diamond-shaped trade-mark for easy specification.

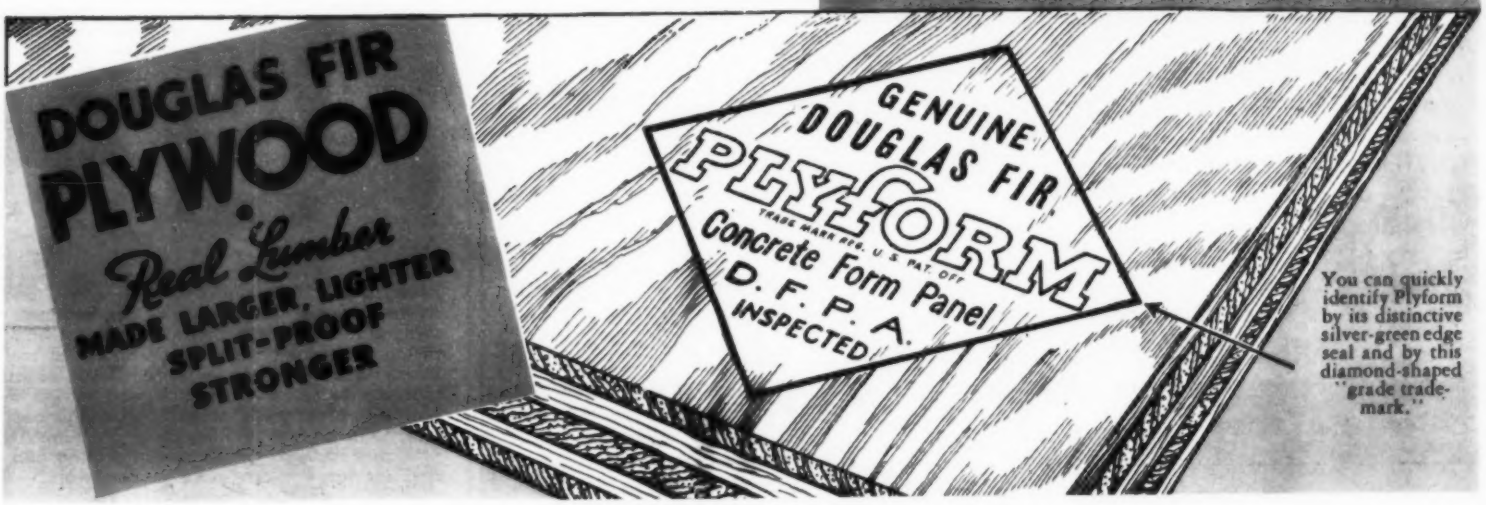
4. In Plyform only special premium water-resistant glues are used.

● In every part of the country, the concrete form grade of Douglas Fir Plywood, trade-marked Plyform, is producing smooth, flawless concrete surfaces *as well as saving time and money!* Plyform panels come to the job sanded satin-smooth, oil-treated and edge-sealed. They are lightweight and easy to handle, yet strong and rigid. Each Plyform panel gives 100% coverage without waste —strips easily—can be used numerous times (some contractors report up to 15 re-uses.) For Technical Booklet, write Douglas Fir Plywood Assn., Tacoma, Wash.

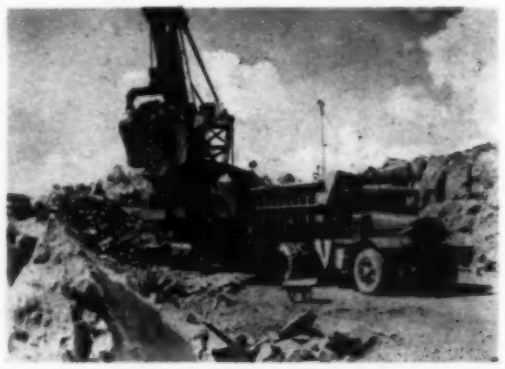


ARIZONA

Concrete bridge supports on the new Kingman-Needles and Kingman-Boulder Dam Highways in Arizona were poured in Plyform forms. The picture shows how easily the panels strip—the flawless surfaces they produce.

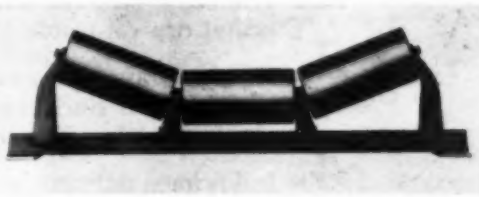


SUPER-DUTY TRUCKS for open pit mining, quarrying and similar "off the road" operations. Two models: Model FC, six-wheeler rated at 100,000 lb. gross vehicle weight with net payload capacity, 30 tons, and four-wheel machine has rating of 60,000 lb., payload capacity, 15 tons; Model FJ as four-wheel unit only, rates at 45,000 lb. and has payload capacity of 11 tons. All three units chain driven and powered either by gasoline, or diesel



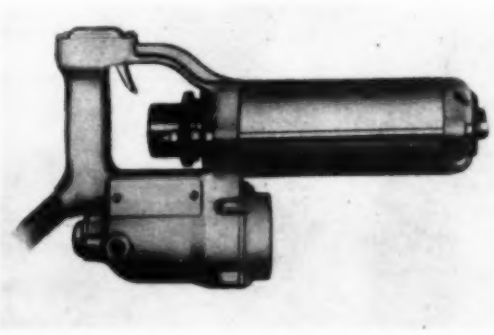
power plants. Standard motive equipment on Model FC is six-cylinder, 5¾x6-in. gas engine having maximum torque of 610 lb./ft. at 900 r.p.m. and 185 hp. at 1,600 r.p.m. Standard engine on Model FJ has six cylinders, 4¾x5¾-in. bore and stroke, develops 455 lb./ft. torque at 800 r.p.m. and turns up 151 hp. at 2,200 r.p.m. Transmissions are specially designed 5-speed boxes with 2-speed integral auxiliaries and offer ten ratios from 12.75:1 low-low to .73:1 high in Model FJ and 14:1 low-low to .73:1 high in FC. High and low reverse gears in main box furnished on order. Other features: (1) Super-duty chrome nickel steel rear axles, with outside diameters (FC) 6½ in., (FJ) 5⅜ in.; (2) large area air brakes equipped with oversize rigid type shoes and heavy block type linings. — **Mack Trucks, Inc., Long Island City, N. Y.**

LOW-COST BELT IDLERS, 43 in., with self-cleaning bases are assembled in jigs to assure proper alignment and correct spacing. Slotted holes in mounting plates permit adjustments in alignment of belt.



Idler rolls machine faced on end and pressed on to shoulders of cast roll ends whose outer edges are rounded and smoothed to prevent injury to belt. Free running anti-friction bearings protected by labyrinth grease seals. Through grease tube is provided from one bearing to other.—**C. O. Bartlett & Snow Co., Cleveland, Ohio.**

ELECTRIC HAMMER for operation on 110-v. a.c. lighting circuit when used with star drills is said to drill holes up to 2 in. in diameter in hardest concrete. Using stone points and cold chisels, it will cut holes through masonry floors and walls for



risers, doors and windows. It also will drive cold rivets. Hammer is made up of two magnets wound around barrel which contains free moving, heavy piston that strikes directly on shank of tool being used. Unusual power for 25-lb. tool is obtained by incorporation of small high speed blower motor in handle which keeps magnet windings cool. Hammer, 16 in. overall and 3½ in. in diameter. Designed primarily for heavy construction drilling and cutting and for large plant maintenance work. — **Syntron Co., Homer City, Pa.**

ELECTRIC HOIST, named "Quik-Lift," is claimed by manufacturer to incorporate maximum amount of efficiency with speed, power and durability. Can be plugged into any circuit or current connection, either a.c. or d.c. Heavy-duty, ball-bearing motor

fully inclosed high starting torque, single and three phase. Hoist built with lubri-seal ball bearings, gear and pinions of special heat-treated alloy steel. Hooks of drop-forged, alloy steel designed to stand 200 per cent overload. Extra heavy load chain. Shoe-type brake. Sturdily built controller. May be had either with hand, hook or trolley suspension in capacities of from 250 to 4,000 lb. Weight, 89 to 195 lb. — **Coffing Hoist Co., Danville, Ill.**

DRILL STEEL SHARPENERS AND OIL FURNACES, for use in mines, quarries and heavy construction work, may be obtained in four sizes: (1) Light-weight, air-operated machine for smaller job where few drills are used; (2) sharpener for small mine, quarry or contract job employing two or more drills;

(3) for medium-size mine, quarry and larger contract job; (4) for permanent blacksmith shop in large mines, quarries and heavy construction work. Features: renewable bushings for die seats, automatic centering devices, additional formers, valves, main cylinders, crosshead rods and frontheads. Maximum gages of bits formed and forged by these models: (1) 2½ in.; (2) 2½ in.; (3) 3 in.; (4) 3⅝ in. Recent development is forging of Jackrod threads

made possible by attachment consisting of set of blocks and die inserts. Blocks, practically non-wearable; dies renewable. Furnace built in two standard sizes and has these advantages: (1) flame blower enables operator to obtain short heat on steel and helps deflect heat; (2) economical, low-pressure burner; (3) heat deflector shuts off glare; (4) steel rest accommodates various lengths of steel; (5) low-pressure air from induction blower and oil-supply line passes through pre-heating chamber before entering burner, aiding combustion and increasing efficiency; (6) fire box lined with refractory material which withstands high temperatures; (7) all bricks of standard size for economy and ease of replacement; (8) oil and air adjusting valves located in cool positions at side of furnace; (9) induction blower uses small quantity of compressed air to induce bulk of low pressure air required for combustion and by flame blower.—**Ingersoll-Rand, 11 Broadway, New York City.**

NEWS FROM MANUFACTURERS
About Their Products

The publications reviewed below, will keep you posted on latest developments in construction equipment and materials available for your use.

CONCRETE MIXERS — **Chain Belt Co.**, Milwaukee, Wis. (One 8-p. and two 16-p. bulletins, and one folder, illustrated.) Complete range of concrete mixers in sizes from 3½S tilter to 14S building units and 27E paver are described in four new publications. Special features include: For 3½S tilter, positive acting drum lock and self-leveling front foot for adjustment on uneven ground; for 5S and 7S units, pressed steel drum heads and rollers, fast-charging "shimmy" skips, accurate water control system, speedy discharge; for 10S and 14S units, thorough mixing action, quick discharge, split-second batch timer, dust-tight housings, one-man controls. On 27E paver all operations of mixing cycle are automatically controlled by "mechanical man"; governor booster speeds motor for fast charging and discharging.

• • •

PORTABLE AIR COMPRESSORS — **Schramm, Inc.**, West Chester, Pa. (22 pp., illustrated.) Covers complete line of "Utility" portable air compressors. Sizes from 85- to 420-cu.ft. capacity are listed, available with either gasoline or diesel engine power. An assortment of portable mounting types are listed for all sizes. Operating data, detailed specifications and pictorial design features are included. A feature of the catalog is a 2-p. spread of a compressor printed in the actual color of the finished product.

• • •

CONCRETE HOUSE SPECIFICATIONS—**Portland Cement Association**, 33 West Grand Ave., Chicago, Ill. (Three folders, illustrated.) Published in loose-leaf form these three folders, the first of a series, designed to constitute a construction manual, present illustrated specifications and construction details covering: (1) Precast joist concrete floors with cast-in-place concrete slabs; (2) portland cement stucco on concrete masonry walls; and (3) application of portland cement paint on exposed concrete masonry walls.

• • •

TRACTOR COST RECORD BOOK — **International Harvester Co.**, 180 N. Michigan Ave., Chicago, Ill. (18 pp., blank forms.) For recording tractor and power unit costs, this book of blank forms has been prepared to cover all fixed operating and maintenance charges, giving the contractor an accurate and comprehensive statistical picture of how his equipment is operating and how much each tractor or power unit is costing. Available with book are pads of operators' daily report forms. Introduction contains suggestions for keeping cost records.

So you're going to build a road . . .

After reading these comments on Cement Batching . . . *can you afford not to consider a Heltzel Model E-1 Portable Bulk Cement Plant?*

aggregate cars and spotting the bucket.

The cement platform was located about two city blocks from the batchers in the direction of the road. There five men in the car stacked the six bags of cement for each batch and made up the split bag required by the specifications. A small scales was put into the car and the required amount of cement weighed out and tied in an extra bag. When the batch trucks reached the last section before the paver five men handled the emptying of the bags, with one of them clipping the bags, two dumping, one knocking the piles down so that the second batch would not spill over onto the first, and one man baling the bags. One man handled the dumping of the batches into the skip of the Koehring 27-E paver.

Clipped from a recent article on concrete paving.

We are mighty pleased with the general appearance and operation of this plant and have followed it closely on this job and we hope that any suggestions we have made will be accepted as constructive.

The best days run they have had on this job so far is 592 batches in eight working hours, each batch has eight bags of cement. While on the job Monday they were averaging 78.4 batches per hour. The Contractor is running 45 trucks and while they are not all the same size, charging operations have been satisfactory. He is using a dual-drum paver and

(Continued on Page 2)

From a letter concerning the operation of the Model E-1 illustrated below.

★ **The name of the magazine in which this article appeared and the contractor referred to in the letter will be furnished on request.**

One operator does all the Cement Batching with the Model E-1 . . . Faster - - Cheaper - - More Accurate . . . why not investigate the possibilities on your job . . . there is no cost or obligation.

Ask for Bulletin 28

HELTZEL STEEL FORM & IRON CO. WARREN, OHIO, U.S.A.

LEANING-WHEEL GRADERS — **J. D. Adams Co.,** Indianapolis, Ind. (24 pp., illustrated.) Describes three models in 8-, 10- and 12-ft. blade sizes, with power or hand controls. Action pictures illustrate the many types of work being done with these graders and their mechanical and operating advantages. Among features of these machines are narrow, all-welded box-type frame, wide range of blade positions, maximum visibility, effective side-shift, and steerable tongue.

• • •

LINEMAN'S SAFETY EQUIPMENT — **Davis Emergency Equipment Co.,** 55 Van Dorn St., New York, N. Y. (8 pp., illustrated.) For protecting the "man on the pole," body belts and safety straps of specially selected leather, pliers, skinning knives and accessories, Stephens climber's irons of special alloy steel, rubber gloves, boots and rubber coats.

• • •

PORTABLE POWER TOOLS — **Mall Tool Co.,** 7740 South Chicago Ave., Chicago, Ill. (Portfolio of illustrated bulletins.) Flexible shaft equipment applied to concrete vibrators, rubbing machines, surfaces and grinders, saws, sump pumps, terrazzo machines, door planes. Also portable electric drills. Vibrators are powered by gas engine, air or electric motor units; they include both high frequency and low frequency units in a wide range of types and sizes.

• • •

DIESEL TRACTOR — **Caterpillar Tractor Co.,** Peoria, Ill. (32 pp. illustrated.) Mechanical features of 61-hp. D7 tractor, with particular emphasis on four-cylinder diesel engine that powers the machine. Cutaway photos trace path of fuel from storage tank to cylinder. Pictures illustrate details of injection valves, injection pumps, crankcase, cylinder heads and pistons. Tractor transmission and tracks are given a separate section of the booklet. Action-pictures show versatility of machine in handling many different types of job. Tractor is built in two gages, 60 and 74 in. Starting is done by independent gasoline engine.

• • •

CONVEYOR AND TRANSMISSION BELTING — **U. S. Rubber Co.,** 1790 Broadway, New York, N. Y. (36 pp., illustrated.) Entitled "Belting Biographies," this booklet presents case histories of transmission and conveyor belting in industrial service. Technical data include advice on selection of proper belt, installation, speed of operation, pulley size, tension and carrying capacity, as well as numerous types of transmission drives and conveyor layouts.

• • •

WATER HAMMER PREVENTION — **Water Hammer Arrester Corp.,** West Pierce and 12th Sts., Milwaukee, Wis. (8 pp., illustrated.) Explains how damaging effect of water hammer on pipe lines may be arrested by mechanical-pneumatic device, consisting of a steel casing in which a metal bellows, containing a compressible fluid, partitions an expansion compartment from a compression compartment.

• • •

ROCK ASPHALT TENNIS COURTS—**Kentucky Rock Asphalt Institute,** 312 S. Fourth St., Louisville, Ky. (23 pp., illustrated.) Describes use of rock asphalt for construction of tennis courts, playgrounds and sidewalks. Suggestions for treating subgrade and drainage problems, methods of base construction and surface courses. Designs and cross-sections of tennis courts and playgrounds. One chapter deals with sidewalks. Advice on maintenance and repair of Kentucky rock asphalt surfaces.

• • •

HYDRAULIC SCRAPERS—**Baker Manufacturing Co.,** Springfield, Ill. (12 pp., illustrated.) Models in capacities from 3 to 10 cu.yd., for use with tractors of from 25 to 75 hp., are designed to dig at constant flat angle in order to reduce power necessary for obtaining capacity loads. In loading, earth passes to rear of pan first, filling from back to front. Dumps and spreads from rear end, which is made wider than front end to prevent "wedging" of earth load. Hydraulic control unit consists of pump, tank, valve hose and fittings mounted on tractor.

WHY CHEVROLET LEADS
in Motor Truck Sales

Why do Chevrolet's 1939 truck sales exceed by 36 per cent* the sales of the next truck manufacturer?

There can be but one reason for Chevrolet's predominant leadership in sales. It is that buyers, in business and in industry, purchase motor trucks as they purchase other capital equipment, on the basis of the maximum return on their investment — and have concluded that the best buy is Chevrolet.

**Latest available R. L. Polk & Company official registration figures through May, 1939.*

1st in Value
1st in Economy
1st in Sales

Lower Prices
Lower Operating Costs
Lower Upkeep

CHEVROLET MOTOR DIVISION, *General Motors Sales Corporation*, DETROIT, MICHIGAN
General Motors Instalment Plan—convenient, economical monthly payments. A General Motors Value.

DESIGNED FOR THE LOAD — CHEVROLET — POWERED FOR THE PULL

MASSIVE NEW SUPREMLINE TRUCK STYLING . . . COUPE-TYPE CABS . . . VASTLY IMPROVED VISIBILITY • FAMOUS VALVE-IN-HEAD TRUCK ENGINE • POWERFUL HYDRAULIC TRUCK BRAKES (Vacuum-Power Brake Equipment optional on Heavy Duty models at additional cost) • FULL-FLOATING REAR AXLE on Heavy Duty models only (2-Speed Axle optional on Heavy Duty models at additional cost)

WATERPROOFED CONCRETE — **Medusa Portland Cement Co.**, Midland Building, Cleveland, Ohio. (36 pp., illustrated.) Entitled "How To Make Good Waterproofed Concrete," this book tells why concrete, stucco, masonry and mortar should be waterproofed during original construction. It explains the essentials of good waterproofed concrete and the advantages of waterproofed cement in making concrete for both above and below grade construction, thereby assuring complete protection against disintegration as well as dampness. Specifications are given for waterproofing all walls and floors both above and below grade. Another section is the specifications for waterproofing existing concrete work.

• • •

OIL BURNERS AND TORCHES — **American Steel Works.** 27th and Southwest Boulevard, Kansas City, Mo. (12 pp., illustrated). Describes line of Fireblo oil burners and torches for general highway construction and maintenance, pipe lines, pavers, roofers and industrial use. Equipment burns kerosene, distillate or light furnace oils. Flame temperature more than 2,000 deg. F. smokeless heat. Single and double torch units.

• • •

HANDBOOK ON TIRES — **B. F. Goodrich Co.**, Akron, Ohio. (96 pp., illustrated, 4x6½-in. size.) Produced for carrying in hip, vest or coat pocket or filing in desk, this revised "Operators Handbook" is designed to provide information for users of all types of tires other than those for passenger cars. Ten pages are devoted to a general discussion of tire problems, the importance of cord construction and other features of tire building for the commercial field, including a chapter on the need to fit the tire to the job to be performed, and another on the functions of the Goodrich tire calculator. Twenty-four pages describe the company's line of truck and bus tires with complete specifications, including those for the new line of Super-Traction tires. Eight pages are devoted to data on the new tractor-grader Super-Traction and other types used on commercial tractors. Discussion and specifications for industrial tires and the wheels on which the solid tires for this purpose are vulcanized covers 15 pp., while similar information on pneumatic wheelbarrow tires takes up 6 pp. Load ratings and inflation pressures for tires in commercial service, tables on tires, rims and dual spacing, load and service diagrams, and load analysis occupy 6 pp., while tables on weights and measures of various commodities and materials take up 3 pp.

• • •

MANGANESE STEEL — **American Manganese Steel Division,** American Brake Shoe & Foundry Co., 389 E. 14th St., Chicago Heights, Ill. (64 pp., illustrated) Results of more than a quarter of a century of specialization in producing alloy steel castings of high impact and abrasion resistance. Tells the story of manganese steel, "the toughest steel known," with illustrations of applications in crushing, grinding, dredging, excavating and road building; mining, quarrying, oil well drilling and railroad equipment. Notes on AMSCO welding rods for reclamation work and hard facing.

• • •

MATERIAL HANDLING EQUIPMENT — **Jeffrey Manufacturing Co.**, Columbus, Ohio. (960 pp., illustrated.) General catalog covers company's line of chains and all types of material handling equipment. Tabular matter and other data designed to be of service to engineers who plan or install material handling equipment in a wide range of industries. Covers conveyors, elevators, transmission machinery, screens and vibrating feeders, crushers, portable loaders and stackers.

RESTRAINTS OF TRADE

(Continued from page 49)

fact that there must be protection from fire and safeguards of minimum health requirements. They develop into legally established boycotts, particularly relating to walls, roofs, electrical work and plumbing. I am reliably informed that plumbing which is good enough for the magnificent

STRENGTH · ELASTICITY · FLEXIBILITY · TOUGHNESS · DURABILITY

FORESIGHT

FRANCIS BACON foresaw airplanes, steamboats, and many of our modern vehicles as early as 1600. It was this foresightedness, plus his ingenuity, which gained for him a lasting reputation.

The ability to look ahead . . . to anticipate the future demands of the industries we serve, has contributed much to the reputation for quality which Leschen Wire Rope enjoys.

By studying trends, and preparing in advance for new developments, we have been able to provide a dependable wire rope for each new condition as it arose.

"HERCULES" (Red-Strand) Wire Rope itself was the result of just such foresight — a superior wire rope developed to efficiently and economically meet the more exacting requirements of modern industry.

With wire rope, it pays to use the best, for therein is the way to increased safety, longer service and more continuous operation. You take no chance when you specify "HERCULES"— the wire rope that has proved its ability by its service record.

"HERCULES" RED-STRAND WIRE ROPE — REG. U.S. PAT. OFF.

In order to be suitable for all purposes, "HERCULES" (Red-Strand) Wire Rope is made in a wide range of both Round Strand and Flattened Strand constructions — all of which are available in either the Standard or Preformed type. We would be glad to have you write us for further details.

MADE ONLY BY

A. LESCHEN & SONS ROPE CO.

WIRE ROPE MAKERS — ESTABLISHED 1857

5909 KENNERLY AVENUE — ST. LOUIS, MISSOURI, U. S. A.

NEW YORK	90 West Street	SAN FRANCISCO	520 Fourth Street
CHICAGO	810 W. Washington Blvd.	PORTLAND	914 N. W. 14th Avenue
DENVER	1554 Wazee Street	SEATTLE	3410 First Avenue South

Department of Justice cannot be used in private homes in many cities.

I do not apprehend serious difficulty with such local protective tariffs as a matter of law. It is necessary only that the effort to clear away such underbrush which blocks the movement of trade be on a sufficiently broad scale to produce results. The campaign must be planned. It must be brought home to the public what is happening to them under the mantle of protection against health and fire.

In dealing with legislative restraints of trade in building, the cooperation of private management is essential. Suppose the business organizations actually engaged in cheaper housing — and there are many such being formed — should design a house and submit it to the most expert attention and checking to ascertain if it met with reasonable standards of fire protection and health. If such plans and specifications thus tested were submitted in all of the principal cities for the purpose of actual construction, the Anti-Trust Division would be in a position to attack as a restraint on interstate commerce any ordinance or the action of any board which prevented the building of a safe and economical house.

The trouble with efforts in the past along these lines is the fact that they have been piece-meal. They have never presented to the courts a comprehensive picture. The reason why a comprehensive picture of such legislation and its effect on interstate commerce needs to be presented is obvious. Only those restraints which are unreasonable can be prosecuted. Unreasonableness is a question of fact. Actual results are what count in determining whether illegal restraints exist. No court can be expected to weigh these results unless the entire picture is shown.

Can the anti-trust laws deal with this situation? My answer is an emphatic "Yes," as far as the law itself is concerned. I am convinced that if we deal in a coordinated way with the entire fabric of restraints from the production of materials through to the final work of labor, we can get cheaper houses by freeing the industry.

Mr. Sprague, of Harvard, has told me that a concerted drop in prices in the heavy industries would result in increased profits through increased volume. I have talked with some of the leaders in those industries about the possibility. At present, they tell me, no one can obtain any substantial increase in volume by dropping the price of his product because the drop will be absorbed elsewhere in the contractors' profits or in labor's reward. One large manufacturer said, "I am at the mercy of my dealers." Similarly, building trades labor thinks that to reduce labor costs is not to create more employment, but to enhance the contractor's profit; and contractors see no benefit in reducing their own charges when labor and materials can take up the slack.

If we proceed on a broad front we can protect those who see the necessity of a simultaneous price drop. We can open the door for substantial price reductions in the heavy industries. We can carry on the effect of that drop by liberating the real competing contractor. And finally we can say to labor, "You can get the same thing that the heavy industries are getting: a greater annual income, based upon having more work to do during the year, without need to stretch the hours of work and the rate of pay on each particular job." Without such assurance it is certainly not fair to expect labor to take the brunt. It is neither fair nor practical to deal with any element of the situation without dealing with all of them.

For the first time in the history of the Anti-Trust Division we expect to have funds to tackle

this problem on a nation-wide scale. The initial step has already been undertaken. A short time ago, Attorney General Murphy gave the announcement on which this speech is predicated. He said that one of the principal concerns of the Anti-Trust Division would be to attack the construction problems on a broad front. The initial step has been taken. Obviously we must proceed with care and preparation before any nation-wide prosecution of the distribution of a product is undertaken. Our activities must also be geared with finance, planning of the use of lands, the taxation of real estate, and the like, so that our principal concern, which is the clearing away of restraints, will bear fruit in actual volume of construction.

Cape Cod Canal

BRIDGE RESURFACING

(Continued from page 47)

bridge. This area was found by test methods to be satisfactory. As a result, in 1938 bids were taken and a contract was awarded to Warren Brothers Roads Co., of Cambridge, Mass., for resurfacing both bridges, using the same design as in the test section. The work was completed during June and July.

Construction Methods—Traffic was accommodated by confining the construction operations to one side of the bridge at a time. Provision was made for meeting the grade of the steel expansion joints at the span ends by surface heating and removing a wedge-shaped section of the old pavement adjacent to each expansion joint, as shown in an accompanying photograph. To confine the inside edge of the first half-width strip, the contractor laid a 1x4-in. wooden strip and spiked it to the pavement. A tack coat of rapid-curing liquified asphalt was applied to the old surface, using the method shown in another photograph to avoid spattering of the bridge structure and of passing traffic such as is apt to occur with the pressure distributor method, especially in windy weather frequently prevailing in this locality.

Design of Resurfacing—A type of resurfacing known by the trade name GranOvia, a patented development of Warren Brothers Co., was used for the work, the owner of the patents waiving patent rights, so far as this specific project was concerned, to permit taking open bids on the desired construction. The design, when applied as resurfacing to an old pavement, consists of: (1) an application of adhesive paint to the existing pavement to unite it to the resurfacing; (2) a course of sheet asphalt mixture to serve as a leveling course and as a bonding and holding layer; and (3) a layer of granular surface mixture composed largely of peastone, which is spread and compressed into the fine mixture until the coarse particules are partially but firmly embedded in the fine mixture, providing in the upper portion an open, granular, non-skid surface.

In resurfacing the Cape Cod bridges, the sheet-

asphalt and granular surface mixtures were produced at a plant about 30 mi. distant. To assure adequate workability for proper compression and for impervious and inconspicuous joints, the mixtures contained the required amount of an asphalt tempering medium, known as Warcolite, which, besides prolonging the workability of the mixtures to the desired degree, also increased the adhesion of the asphalt to the rock and tended to prevent stripping.

Laying and Compacting—Sheet asphalt was designed to be completely waterproof when compacted and was laid ½ in. thick by means of an Adnun spreader. After partial compression of this layer, the granular surface mixture was laid by the same means to an equal compacted depth, and both layers were compressed into one by rolling.

As the new surface is designed to be impervious, it is expected to put an end to the infiltration of water which had caused deterioration of the original bituminous concrete. The 1-in. surface treatment adds about 11 lb. per square foot to the weight of the deck but this additional weight does not seriously reduce the factor of safety, according to the consulting engineers.

FLORIDA OVERSEAS HIGHWAY

(Continued from page 63)

men working from portable platforms spanning between the curb forms. To assure proper setting under the severe local climatic conditions, sections of the deck were ponded as quickly as possible after they were poured. Sea water was pumped into the ponded sections and kept on the latter until the concrete had hardened. During this period the curbs also were covered with burlap that was kept wet.

Stripping and Rehandling Forms — When sections of the forms were ready to be stripped, men working underneath the deck on the steel structure knocked out the wedges which held the sections up against the top flanges of the steel floor beams. The sections were thus dropped down to rest loosely on the bottom flanges of the steel beams. With a truck-mounted crane, traveling on the finished roadway of the deck, the sections were pulled out and lowered to a lighter alongside on which they were shifted to the next position. Working in this manner, the form sections were rarely ever damaged in operation, all of the sections being used five times on the job.

Light-Travelers — Light structural-steel travelers mounted on two pairs of automobile wheels were used effectively in handling various operations on the 7-mi.-long bridge. All of these were of more or less the same design, as illustrated herewith. A second picture also shows the cantilever platform suspended from both ends of these travelers from which men made electric welds, painted steel, finished concrete and conducted various special operations.

These travelers were easily pushed along the

Again the WINNING BIDDER

USES THE *REX 160 PUMPCRETE!*

FROM HERE

Concrete goes from Mete-Miser to Pumpcrete (in house) to pipe line.

TO HERE

Through the six-inch pipe line, concrete is sent to every part of the job—no complicated form work—no buggy runs, hoists or towers.

TO HERE

Concrete reaches the floor slabs through the pipe line, suspended from overhead beams. 12 to 20 cu. yds. go into the slab every hour.

PUMPS 15,000 YDS. OF CONCRETE FOR NEW MILWAUKEE HIGH SCHOOL!

You've got to bid low to get the jobs these days, but you've got to bid safely, too. And going after jobs on the safest possible basis is a habit of the Kroening Engineering Corporation. When preparing their bid for this $2,500,000 Pulaski High School, they compared the cost of using ordinary methods to place 15,000 yds. of concrete into light sectioned beams, walls, floors and roofs, as against the cost of doing it with the Rex 160 Pumpcrete. Result: *another Pumpcrete job and another profitable 17-months' work for the Kroening Engineering Corporation!*

You'll find that with one of the Rex Pumpcretes on your payroll, you, too, can get more profitable concrete jobs like this. The Rex Pumpcretes, the concrete pumps with capacities ranging from 15 to 65 cu. yds. per hour, have what you need to outbid the field in 1939! Investigate now!

CHAIN BELT COMPANY *OF MILWAUKEE*

PROCESS—GIESE • SYSTEM—KOOYMAN

REX PUMPCRETE

Send for this new free book—Today!

This new book, "Presenting the Rex 160 Pumperete," gives you the real low-down on what the Rex 160 Pumperete can do for you on all sorts of jobs. Complete with information concerning pumping heights, pumpable mixes, etc., it will give you many helpful hints on how you, too, can outbid the field. It's yours for the asking—just fill in and send this coupon.

CHAIN BELT COMPANY
Construction Equipment Division
1664 West Bruce Street, Milwaukee, Wisconsin

Please send me my copy of "Presenting the Rex 160 Pumperete."

*Firm Name*_____

*By*_____ *Title*_____

*Address*_____

*City*_____ *State*_____

finished deck of the bridge by hand. They eliminated need for any falsework from which work underneath the structure would be handled. They also provided ample clearance for the movement through them of cars and trucks used in construction operations on the bridge roadway.

Placing Deck Atop Through Trusses

Placing of the deck on top of the mile of through-trusses across Bahia Honda presented about the same problems as in decking the steel girder spans of the Seven-Mile bridge. The details of the design of this decking are shown in an accompanying drawing. Materials for this job were assembled in yards at one end of the structure, where traveling cranes unloaded sand and stone from lighters and charged them into a batching plant. From the latter, dump-trucks were operated at the railroad track level of the bridge to deliver to a mixer set up at that level. The mixer discharged into a bucket elevator which hoisted the concrete to the level of the top deck.

Beginning at the end nearest the material yard, the concreting was carried forward toward the opposite end. At intervals the mixing plant and hoisting outfit were shifted ahead to keep the haul from the top of the elevator to the point where pouring was in progress to a reasonable distance. Delivery of concrete from the top of the elevator to the forms was made in one-man pneumatic-tired buggies. Two-man portable timber platforms were used effectively as single-track runways for the buggies. By shifting the platforms, turnouts were obtained wherever needed, thus permitting the loaded buggies always to have the right of way and reducing delays in the movement of the streams of empties to a minimum.

Approaches to the top deck of the mile-long bridge were obtained by placing towers on the original concrete piers which carried girder spans at both ends of the structure to carry the girders in a new position on an incline. In each case the girders were swung around out of position while the towers were being set, after which the girders were swung back on top of the towers.

At one end where nine 80-ft. girders over open water were handled in this manner, two large shear-leg derricks were employed effectively by the subcontractors for the Wisconsin Bridge & Iron Co., general contractors for rebuilding the Bahia Honda bridge. One of these derricks picked up a pair of girders and swung them around so the second derrick could set a pair of towers. Then the first derrick swung the pair of girders into the new elevated position, and the operation was repeated until all nine pairs of girders had been raised.

At the opposite end of the bridge the inclined approach was built on land without any special problems being involved.

Personnel — For the Overseas Road and Toll Bridge District B. M. Duncan, was general manager and chief engineer; A. L. West, bridge engineer; and T. L. Hoskins, project engineer in charge of the reconstruction of the Seven-Mile bridge and building of adjacent sections of the highway on land. Project Engineer Nichols had charge of the rebuilding of the Bahia Honda bridge and adjacent highway sections.

P. F. Huntington was superintendent for S. J. Groves & Sons Co. of Minneapolis, Minn., on the decking of the steel girder spans of the Seven-Mile bridge and A. Henson held the same position on the remainder of that contract.

West Point ATHLETIC FIELD ON FILLED LAND

(Continued from page 69)

were built near the site and a committee of track coaches and cadet track squad members chose the type of surface to their liking, which consisted of a mixture of 3 parts of cinders (smaller than ¼ in.) and 1 part of topsoil having a high percentage of clay. A course of this composition, 2 in. deep after compaction, was placed on the track, shaped to correct contour and rolled with a light roller.

The track was so graded as to have a crown of about 3 in. on the straight-aways and a super-elevation of 1 in. in 6 ft. on the circular ends. The transition from crown to super-elevation was proportionately distributed over one-half of each semi-circle. Upon the completion of the track, 2x3-in. rails with rounded edges were fastened to the top of the curbs by means of lag screws, the heads of which were countersunk and puttied over. The rails were painted white, thus sharply defining the edge of the track.

Pits and Runways — Within the infield of the track a football field is laid out, and various pits and runways are constructed for pole vault, broad jumps, shot put, discus and javelin throws and other events. For the pole vault, an 8-in. layer of cinders covers the bottom of the pit, on top of which is placed a covering of pine shavings 30 in. deep. The bottom of the broad jump pit is covered with 8 in. of cinders, on top of which is a 16-in. layer of clean, fine sand.

Except for dimensions, the high jump pit is similar to the pole vault pit. The high jump runway is surfaced with clay varying in depth from 12 in. at the pit to 8 in. at the other extremity. On the javelin throw runway the surface consists of 6 in. of clay.

All runways and pits are curbed with 3x8-in. creosoted Douglas fir planks, fastened with lag screws to 4x4-in. creosoted posts set outside the runway or pit areas. The two shot put rings are 7 ft. in diameter and are marked by ½x4-in. iron hoops filled with 12 in. of heavy clay.

The two discus throw rings have a diameter of 8 ft. 2½ in. and are otherwise the same as the shot put rings.

Direction — Work on the athletic field was done by the Highway Division of the Office of the Post Quartermaster with WPA labor. The Army Athletic Association collaborated in providing the detailed dimensions of the track, jumping pits and other elements of the field. For the quartermaster, the writer had direct supervision of construction work during the life of the project.

SERVICE Construction Methods and Equipment SECTION

SEARCHLIGHT SECTION

Employment—Business Opportunities—Equipment — Used or Resale

EMPLOYMENT

Do you need competent men? Men experienced in the construction industry? Or are you seeking employment in this field? Or are you looking for — or offering — a business opportunity of special interest to men in the industry served by this publication. The solution of any of these problems can be found first among the other 20,000 subscribers of Construction Methods & Equipment. You can get their attention — at small cost — through an advertisement here.

FOR SALE
A BARGAIN
Reconditioned Link-Belt K-2 shovel
Waukesha "WL" gasoline engine; 1-yd. Amsco dipper. Guaranteed. Location Fonda, N. Y. Write or wire
C. S. LEWIS
110 Dickinson St., Utica, N. Y.

2,300 LBS. OF ROD ELIMINATE 15 TONS OF RIVETS

This 13-floor Woman's Hospital of Pittsburgh was erected adjacent to another and within 200 feet of two more hospitals. Completely arc-welded construction with FlexArc welders enabled the job to be completed noiselessly in 58 working days. $300.00 worth of electric power and 2,300 lbs. of welding rod eliminated 15 tons of rivets in fusing the 1,000 tons of steel used on the job.

• • •

One of the Westinghouse FlexArc A-C transformer type welders used.

FLEXARC WELDER with just ONE PRE-SET CONTROL

shows way to quiet, quicker construction

Fifteen tons of rivets represent a lot of noise, as well as labor and material costs in steel erection! That's why welded construction on jobs like that above means advantages to everybody.

Westinghouse **FLEXARC** welders bring advantages even closer home with cost-reducing, "streamlined control" no other welder has. A single, pre-set control does the job, on both A-C and engine-driven D-C models. Time-consuming trips back and forth for readjustments are eliminated. Stronger, denser welds result because **FLEXARC** eliminates the factors that cause "jumpy," fluctuating welding current.

Westinghouse **FLEXARC** welders, both for use with alternating current, and equipped with powerful Chrysler engines for D-C portable service, are built in a complete range of sizes to meet heaviest demands. Get full facts about them and the FlexArc rental plan. Just mail the coupon. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Dept. 7-N.

J-70208

Westinghouse Flexarc Welders

☐ More details, please, on FLEXARC welders.

☐ We're interested in the FlexArc RENTAL PLAN. Please tell us where they are available.

Name _____

Company _____

Address _____

City _____

CONSTRUCTION Methods and Equipment

ADVERTISERS IN THIS ISSUE

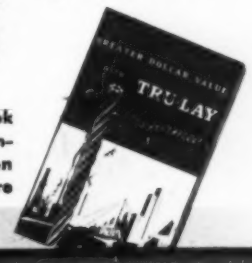
● Industrial operators everywhere have found that TRU-LAY Preformed Wire Rope will move more dirt (do more work regardless of kind) for a much longer time.

Regardless of the machine or job, TRU-LAY Preformed invariably lasts longer. It lasts longer because it is a relaxed, preformed rope. It resists kinking, handles easier and has amazing resistance to the fatigue of reverse bending. It spools better and resists rotating in sheave grooves. Being preformed, TRU-LAY requires no seizing when cut, will not fly apart. Specify TRU-LAY Preformed for your job. Gain its greater dollar value. All American Cable ropes made of Improved Plow Steel are identified by the **Emerald Strand.**

BUY ACCO QUALITY *whether it is American Cable Division's wire ropes and slings—American Chains (Weed Tire Chains, Welded or Weldless Chains)—Campbell Abrasive Cutting Machines—Ford Chain Blocks and Trolleys—Page Chain Link Fence—Page Welding Wire—Page Traffic Tape—Reading-Pratt & Cady Valves—or any other of the 137 ACCO Products.*

See our exhibit, Metals Building, New York World's Fair

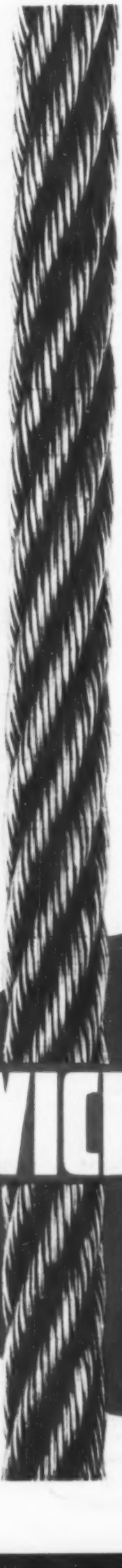
AMERICAN CABLE DIVISION
WILKES-BARRE, PENNSYLVANIA
District Offices: Atlanta, Chicago, Detroit, Denver, Los Angeles, New York, Philadelphia, Pittsburgh, Houston, San Francisco

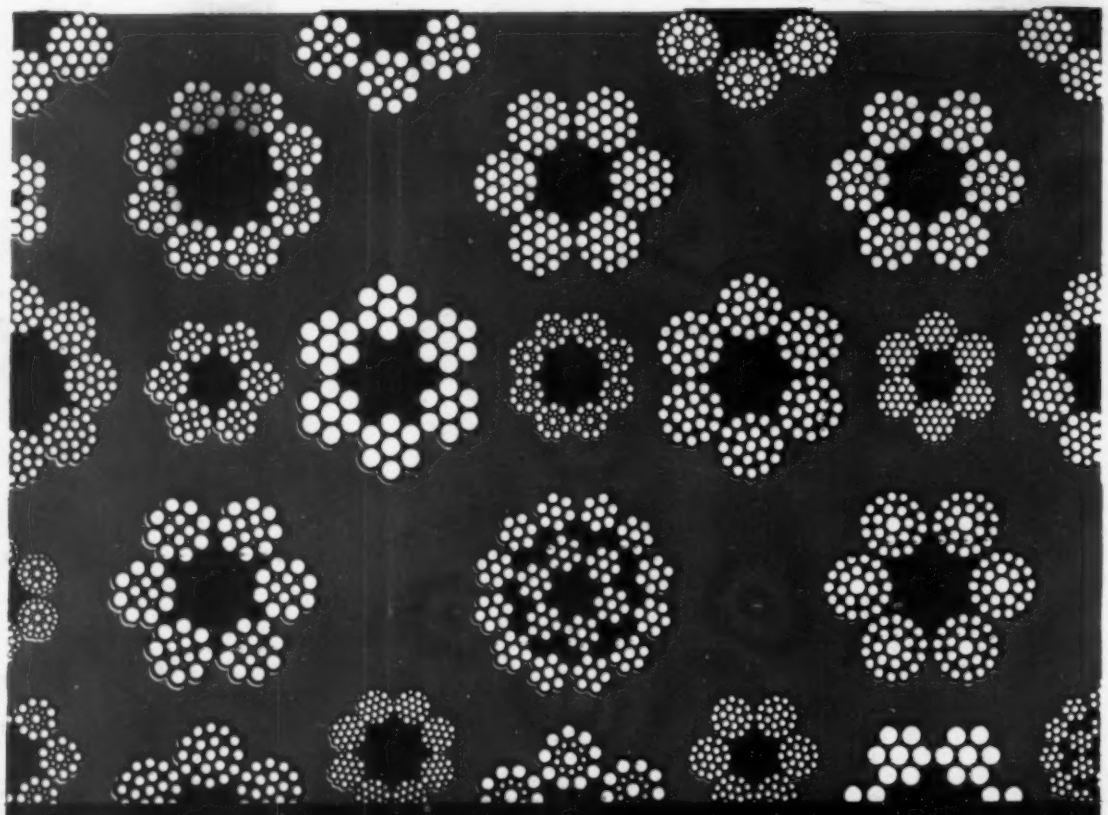


Send for this free book today. It contains constructive information of value to every wire rope user.

AMERICAN CHAIN & CABLE COMPANY, Inc.

AMERICAN CHAIN DIVISION • AMERICAN CABLE DIVISION • ANDREW C. CAMPBELL DIVISION • FORD CHAIN BLOCK DIVISION • HAZARD WIRE ROPE DIVISION • HIGHLAND IRON AND STEEL DIVISION • MANLEY MANUFACTURING DIVISION • OWEN SILENT SPRING COMPANY, INC. • PAGE STEEL AND WIRE DIVISION • READING-PRATT & CADY DIVISION • READING STEEL CASTING DIVISION • WRIGHT MANUFACTURING DIVISION • IN CANADA: DOMINION CHAIN COMPANY, LTD. • IN ENGLAND: BRITISH WIRE PRODUCTS, LTD. • THE PARSONS CHAIN COMPANY, LTD. • *In Business for Your Safety*





ALL CONSTRUCTIONS AND SIZES ARE MADE IN WISSCOLAY PREFORMED

Rope quality is important . . . but construction to meet conditions of use is likewise essential in reducing rope costs. Number of strands, relative sizes of wires, nature of core and kind of metal must be correctly combined to give you the longest possible rope life. You can get exactly the best combination for your use in Wisscolay Preformed. And as for quality . . . there is no better rope made than WICKWIRE ROPE.

WICKWIRE ROPE

WICKWIRE SPENCER STEEL COMPANY

General Offices: 500 Fifth Avenue, New York City; Sales Offices and Warehouses: Worcester, New York, Chicago, Buffalo, San Francisco, Los Angeles, Tulsa, Chattanooga, Houston, Abilene, Texas, Seattle. Export Sales Department: New York City